

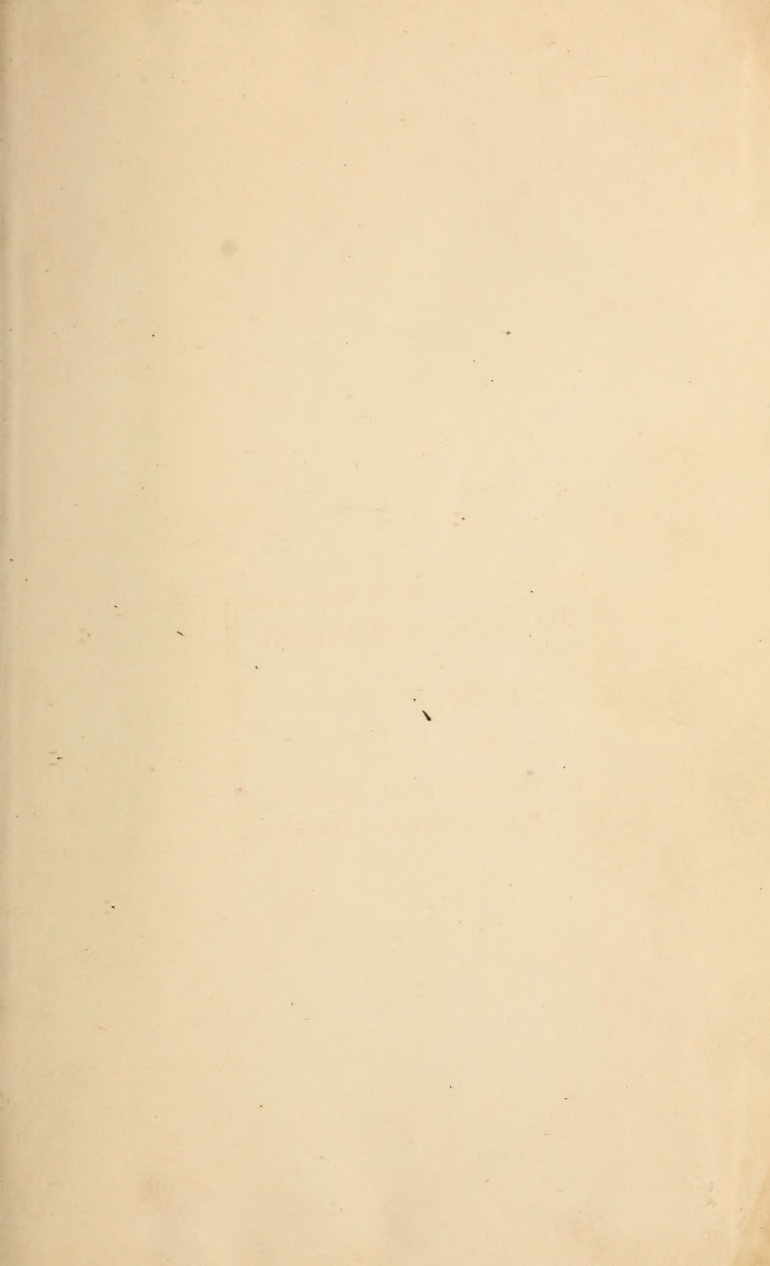
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AN
ESSAY
ON
AGRICULTURE;

CONTAINING
AN INTRODUCTION, IN WHICH THE SCIENCE OF
AGRICULTURE IS POINTED OUT, BY A CAREFUL
ATTENTION TO THE WORKS OF NATURE;

ALSO,
THE MEANS OF RENDERING BARREN SOILS
LUXURIANTLY PRODUCTIVE, AT A VERY
MODERATE EXPENSE, AND OF BENEFICI-
ALLY EMPLOYING THE INDUSTRIOUS AND
UN-OCCUPIED POOR.

TO WHICH IS ADDED,
A MEMOIR,
DRAWN UP, AT THE EXPRESS DESIRE OF
HIS IMPERIAL HIGHNESS THE
ARCH-DUKE JOHN OF AUSTRIA,
ON THE NATURE AND NUTRITIVE QUALITIES OF
FIORIN GRASS,

WITH PRACTICAL REMARKS ON ITS ABUNDANT
PROPERTIES, AND THE BEST MODE OF CULTI-
VATING THAT EXTRAORDINARY VEGETABLE.

By WILLIAM RICHARDSON, D.D.

London:

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1818.

ESSAY

AGRICULTURE

AN EXPERIMENTAL INQUIRY INTO THE CAUSES OF
AGRICULTURAL PROGRESS AND A PRACTICAL
ATTENTION TO THE THEORY OF CULTURE

THE REASONS OF MODERN AGRICULTURE
ILLUSTRATED BY A VERY
MODERATE EXPERIENCE AND OF PRACTICAL
ALLY EMPLOYING THE INDUSTRIOUS AND
EXPERIMENTAL TOOLS

A MEMOIR

OF THE LIFE OF THE LATE LORD OF

HIS EXCELLENCY HERRN VON

ARCHDUEKE JOHN OF AUSTRIA

BY THE EARL OF MONTAGUE

FIORIN CLASS

WITH PRACTICAL REMARKS ON THE AGRICULTURE
OF THE PRESENT AND THE PAST AND THE FUTURE
OF THE AGRICULTURE OF THE PRESENT

BY WILLIAM RICHARDSON, D.D.

B. R. Howlett, Printer, 10, Frith Street, Soho.

SB197
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TO THE READER,

THE Publishers deem it necessary to premise, that this Essay was printed and sent to the *Board of Agriculture*, to compete for the Premium of £100, offered by the Board to be adjudged to the Author of the most approved Paper on the following subject, viz.:—“ *On the best means of employing the industrious and unoccupied poor;*” and the Author was included among the successful candidates on that occasion, whose merits appeared to the Board so equally balanced, that the Premium was ordered to be divided in equal proportions among them; but an objection was afterwards started, and proved fatal, that its being already printed, rendered it ineligible to compete for the Prize; but as its failure was solely to be attributed to this circumstance, the Board to mark their approbation of its merits, unanimously voted Dr. Richardson the Honorary Medal.

Mr. Curwen, in his recent publication, “ *On the State of Ireland,*” thus expresses himself:—“ The planting of Fiorin must be a wise measure, as it brings surfaces which before were wholly unproductive, on a par with soils of infinitely superior quality in their neighbourhood; and when the immense number of such boggy acres in Ireland are taken into consideration; the benefit which may be derived by the cultivation of Fiorin on them, becomes a most important object, and entitles Dr. Richardson to the thanks of his country.” Vol. 2, p. 321.

You were so good as to return my visit, and to report most favourably of my exertions in the agricultural department I had selected for myself; and now when informed of my intention to publish this Essay, you kindly contributed your powerful assistance, furnishing me with important topics, which unfortunately, came too late for me to avail myself of them in this publication, already gone to London; but I shall take the liberty *here* of making some observations upon them.

Our ideas in general coincide, and our objects are the same, though our modes of pursuing them may be different, and mine rather *novel*. A variation in the measures to be adopted for the attainment of the same ends, may be a valuable acquisition; as where change of circumstances make certain measures inapplicable, it must be of great importance to have others in reserve which may supply their place.

We have, no doubt, an immense population to maintain, a large portion of which does not co-operate *directly* to their own support; and we know well, that the grain imported in the years antecedent to a late mo-

mentary redundance, cost the nation above forty millions.

To stop this ruinous expenditure, and to provide food for an increasing population, is a problem of vital importance, and happy shall we be, if in the solution of it, we find employment for the *industrious and unoccupied poor*.

You carry your speculations still further, and “hope to see us become growers of grain, and instead of supplying *Europe* with manufactures, furnishing it with *food* :” and you say, “you do not know to what extent grain might not be multiplied, by the application of *capital* to agriculture.”

I know not any person so well qualified to pronounce upon this subject as you are ;—of long experience—acute penetration—and extensive practice on every scale. Who can so well judge of the value of *capital*, in a line which you have so long pursued with the greatest zeal, and for your success in which you have obtained the highest applause?

Nor are you to suppose I entertain a different opinion from you on the subject of *capital*, when I tell you, that in the following Essay, I in *no one* instance call for *capital* to

aid me in carrying on the measures I suggest ; all tending *directly*, or *indirectly* to our common and grand object ;—the increase of food for our increasing population, or its domestic animals ;—and this by the aid of the *industrious and unoccupied poor*.

Capital is possessed by few ; and it is by the aid of *numbers* the greatest measures are most successfully carried. Instead, therefore, of calling upon *capitalists*, I endeavour to rouse into action, the mass of proprietors, interested in the fields upon the improvement of which I call for their exertions.

I have no rivalry with capitalists, nor the other skilful agriculturists, now in possession of the rich cultivated area, so extensively spread over our islands ;—I meddle with none of it ;—I leave it with confidence in these able hands, and trust that by attention to the suggestions and examples of MR. CURWEN, and such wise speculators, and skilful practitioners, we shall see that *area* improved and extended, as far as ingenuity and merit, aided by capital, can enable it to reach.

I request to be considered only as an humble coadjutor, labouring to increase our stock of animal and vegetable food from a different

and *new* area, and by novel measures, untried by preceding improvers.

You complain to me, that part of *your field* is employed in a manner you do not like, and lament that “*that some of your land of the best quality is applied to pasture ;*” and by skilful calculation, compute the quantities of *animal* and *vegetable* food, raised from equal areas, by *pasture*, and by your favourite measure of *house soiling*.

You know that in this latter measure I am a powerful *coadjutor* ; — you asked me, at *Workington*, if I could assist you with *soil*, in the critical interval between the end of the *clover* crops, and the coming in of *turnips*, when you were distressed for food for your house cattle ; and you know I showed you *in that very period*, on my own meadows, and on those of other friends, a fleece of grass far superior to your best clover crops ; and my friend, Sir James Stewart, has found by accurate experiments, that his *fiorin* meadows at Coltness, yield him a far greater quantity of vegetable food, than his best turnip crops.

You cannot reconcile yourself to the application of so much good ground to *pasture*, and you assert, “ the whole cattle of England

might be maintained on one third the land applied to that purpose." Surely you will acknowledge me as your *coadjutor*, when you find that much of my speculations are employed in creating *new pastures*, by which the agriculturist will be greatly relieved from the load of cattle that you complain of.

You also suggest a mode of increasing our supply of animal food, (*the improvement of our fisheries*) which, as you say, "would free some of the lands of the best quality now applied to pasture."—Will you not be gratified to see these lands restored to the agriculturist, when I find beyond your territories, abundant pasture for these same cattle, as you will soon see I do?

You call your favourite system of soiling to your assistance, in recovering some of the lands which ought to be applied to tillage; you say, "you calculate, you can rear and fatten a beast of sixty stone, on the produce of *two acres*;—probably six acres of pasture would not supply an equal quantity;" and you sustain your positions by fair deductions from data, with which you are well acquainted.

As your *coadjutor*, I hope, in many instances, to recover even these two acres for you,

as the new grounds I mean to bring into profit, which the agriculturist would not deign to expend labour upon; will, I hope, afford not only *pasture*, but *winter food* for fattening cattle; not indeed for beasts of *sixty* stone, but I answer for cattle of *forty* stone, and to the full as good animal food for every purpose, but exportation.

You say, “Nothing short of a miracle can stop the population of Ireland;” I admit *our* population has been long increasing with alarming rapidity; your increase in England, even during a bloody war, has been very formidable; but the question, whether it would be *possible*, and *prudent*, to arrest the progress of this population, is not the one immediately before us;—admitting it to be decided in the affirmative, I much doubt our powers of interfering successfully; the measures that have already been suggested for the purpose, are most of them *weak*; some of them have been pronounced *wicked*, and I fear *all* inapplicable.

We are not *now* to trouble ourselves with such speculations; let us exert ourselves to raise food and find employment for our

population, whatever it may be, *permitte*
Divis cætera, and shall our exertions produce
a redundance, we have a sure resource in ex-
portation, to which you, yourself, already
look forward with an anxious eye.

I am, Sir,

Your sincere friend,

and humble servant,

W. RICHARDSON, D.D.

ESSAY

ON

AGRICULTURE AS A SCIENCE.

I HAVE often lamented, that Agriculture, far from being considered as a science, and treated as such, was reduced merely to a measure of practice, and left in the hands of persons little qualified to advance the theoretical knowledge of this useful branch of learning, and little disposed to improve its practice, by changing the usages to which they were most obstinately attached, or even to admit that their practices were capable of receiving improvement.

This earliest, and most necessary of all sciences, ought, as I think, to be considered as consisting of three separate departments, distinct from each other; the THEORETICAL, —the EXPERIMENTAL,—and the PRACTICAL.

The *First*, and *Second*, are at present quite absorbed by the Third, without any prospect of emerging in their proper and distinct characters.

I shall endeavour to describe the qualities which I conceive the dormant personages representing these several departments ought to possess, and their respective offices.

The THEORIST should be well acquainted with natural history in general, as well as with that of the several vege-

tables we are used to cultivate for our own consumption, or that of our domestic animals; their *habits*, their *properties*, their seasons of attaining perfection. He watches the progress of Nature with attention, and combines his general observations with those he has made on the particularities of each separate vegetable, and then speculates on the modes of culture best suited to them, and the soils best adapted to them, and likely to make them bring forward their produce in the greatest abundance, and highest perfection.

Are the suggestions of the *theorist* to be immediately adopted, and carried into practice? By no means—they must undergo the test of experiment;—here the *second* department of the Agricultural School, as arranged by me, opens, and a new personage is introduced.

The EXPERIMENTALIST should be careful, patient, and diligent, without prejudices, or even opinions on the subjects before him; he is to make his experiments on the very smallest scale, so that he can diversify them without expence, and without having any interest in their success:—failure is to him exactly the same thing, as information is his sole object.

This personage adopts the ideas, and if you please the whims of the *theorist*, which he is not to presume to call *Utopian*:—he gives them a fair and patient trial under different circumstances, and on a small scale; should he discover any thing in the slightest degree promising, he repeats, and varies his experiments until he satisfies himself, either that the measure is a vain one, or that it deserves attention; in this latter case, the experimentalist makes his report to the agriculturists, recommends to them to try the measure on a larger scale, and in actual practice.

Even *expence*, ultimately so important, is not in an early stage to stop proceedings; for the object immediately

before the school is to devise, by what means the vegetable in their hands can be brought to the highest degree of perfection and utility: the question of expence comes next; this, on his diminutive scale, is nothing to the experimentalist,—but should it threaten to be weighty, the ingenuity of all parties is now to be exerted, to find *succedanea*; and a knowledge of the subject being acquired, measures may be devised, which will attain the object by more accessible means.

The *third* character in the drama is the PRACTICAL AGRICULTURIST, of whom I complain that he has taken upon himself the whole three characters I mentioned: he treats the theorist with supercilious contempt, as presuming to obtrude his wild speculations into a department of which he considers himself as complete master.

Hence improvements are discouraged, and discoveries that might have proved useful, are nipped in the bud.

The *second* character I wish to introduce, does not yet exist; whence it comes, that discoveries which have been forced into attention, rarely meet with a fair trial; they are encountered by the *practical farmer* with prejudice, and even with jealousy. They are considered as obtrusions; and treated as uninvited, unwelcome strangers.

Sometimes, indeed, the practical farmer persuades himself, that he has assumed the character of the *experimentalist*, and tells us he has made the experiment;—that is, he has cultivated a field in a particular way: but it is not from solitary trials on a great scale, that information is to be obtained; experiments lead us to knowledge by *comparison*; they should be multiplied and diversified.

Hence agriculture, *as a science*, is at a stand:—the present possessor of the field, perfectly satisfied with his own attainments, and in high admiration of his own

practices, (often very good) does not admit improvement to be necessary, and indignantly rejects any innovation.

He is encouraged in his contempt for theoretical speculations, by the ridicule which a witty author throws on the agricultural *projectors* of his day.

It is just a century since SWIFT made a bitter attack on the ROYAL SOCIETY, which he describes, “*as a Set of Projectors lately incorporated by Royal Patent.*”

It is not for me to defend this respectable body : a century has intervened since this wanton attack was made upon them, and their merits or demerits are best appreciated by their intermediate proceedings and *transactions*.

My object in referring to the passage in SWIFT'S LAPUTA, is to throw light on the arrangement I have made in the agricultural science, and to afford proof of its propriety.

SWIFT says, “ the professors contrive new rules and methods of agriculture—new instruments and tools ; all the fruits of the earth shall come to maturity, at whatever season we think fit to choose, and increase an hundred fold more than they do at present.”

He states, “ the result of all this to be, that none of these projects are yet brought to perfection, and in the mean time the whole country lies miserably wasted, by all which, instead of being discouraged, they are fifty times more bent on prosecuting their schemes.”

Admitting this to be a fair account of the facts in Swift's day, (which I much doubt) the picture he draws is a necessary result of his own statements, from which we can infer,—That in his time *projectors* were wild and speculative, *practical agriculturists* not quite so averse from innovations as at present, but equally tenacious of their practices when once adopted.

The whole mischief (admitting it to have existed) obviously arose from Swift's having omitted a personage in the agricultural drama; forming a coalition between the wild theorist and the positive practical farmer; omitting the intermediate personage, the experimentalist, who would have protected them both from mischief; suppressing the extravagancies of the projector, and paying every attention to his suggestions that bore the test of experiment; and suffering nothing to pass into practice, which did not afford a reasonable prospect of advancing the agricultural science, and multiplying the benefits derived from it.

Let us try two or three agricultural questions, by the test of the arrangement I have suggested, and we shall see what progress the science has made without them, and to what state it probably would have advanced, had they been adopted.

I commence with the *Gramina*, my own immediate department. The importance of grassy produce to the agriculturist is obvious: his summer pasture, and winter provision for his cattle, are derived from the *Gramina*;—for the latter, HAY is his grand resource.

NATURE has been very liberal to us in this department, and has given us, as my friend SIR HUMPHRY DAVY states, 215 varieties of grass, of which he complains, practical agriculturists sow but two, *rye-grass* and *cock's-foot*; the latter too is of very recent introduction, and first recommended *to the world* by myself.

The *seedsmen*, indeed, who have the commodity for sale, are very ready to recommend certain varieties of grass, and to state the proportions in which their seed ought to be mixed.

I have on former occasions (and have not yet done) exposed the consummate ignorance, and mischievous dishonesty of these *charlatans*.

We have Sir Humphry Davy's high authority for the wretched progress this important branch of agriculture has made. Let us then suppose it to be taken out of the possession of mercenary seedsmen and opinionated farmers, and placed in the hands of the agricultural school, arranged as I have supposed, and we may easily foretell the result.

The THEORIST takes up the question *a priori*, and inquires what are the uses to which the gramina are applied? and then, with a reference to these uses, what are the qualities, or properties that should make a grass valuable? He soon finds *three* are predominant, *earliness*, *luxuriance*, and *quick powers of reproduction* when mowed or eaten down.

The theorist now hands over the question to the experimentalist, and desires him to find out by numerous experiments, what varieties possess these properties in the highest degree, that they may be recommended to the practical farmer.

Sir H. Davy now steps in to aid both: he states, *a priori*, another most valuable property of grass, the *quantity of nutritive matter* produced by a given portion of each, and, availing himself of his exquisite chemical skill, he makes the experiments himself, and gives the valuable result to the world.

I know not any question in Rural practice that more requires the interference of the scientific theorist than the proper period for mowing, nor any point upon which the practical farmer is more ignorant or more opinionated. He prides himself on having saved his hay before others, and boasts of its fragrance and tea-like verdure.

The THEORIST acquainted with natural history would have told him, that the juices of all vegetables attain their

greatest perfection in their inflorescence,—that it is at this period alone, all extracts from vegetable substances are taken; and as in the case of hay the whole vegetable is preserved, it is of great importance that it should be mowed in its highest state of perfection, that is, when the predominant varieties of grass are *in flower*.

The practical farmer knows nothing of all this. He has his own rules for deciding on maturity, and generally cuts his crop, before either the *cock's foot* or the *rye grass* (the two earliest of our predominant grasses) are in flower.

I sometimes feel an ill-natured pleasure, when I see the trampcocks of these early gentry collapse considerably for want of substance, giving evidence of premature mowing, and establishing the inferiority of the hay.

Here the experimentalist would be useful, by enabling us to compare portions of hay from the same crop, cut at different periods;—even the farmer himself, would he condescend to doubt, might soon satisfy himself, by leaving the amount of a trampcock uncut for one, two, or perhaps three weeks later than the rest, he would probably find his hay firmer and better; he is certain, also, the quantity is somewhat increased.

Were the arrangement I recommend adopted, many agricultural questions of much importance would receive speedy solutions.—That of the proper seasons for sowing our several grains has been much agitated.

Upon this question the theorist would pronounce generally, that agricultural policy directed the season for sowing each vegetable to be so chosen, that it might remain above ground in the very best portion of the year, neither exposed unnecessarily to late frosts in its tender state, nor to premature winter severities when ripening its seed.

Hence the season for sowing each vegetable, should be

determined by the interval between the seed and the sickle, which nature has assigned to each species, corresponding with the period of gestation in animals, and unalterably fixed at the time of their original formation. Upon this principle it is obvious, that the vegetables of slowest growth should be sown first, while those of quicker progress should be delayed longer.

The question has now reached the experimentalist, who will probably sow many varieties in distinct plots on the same day, and by accurately observing their times of ripening, will make himself acquainted with their respective periods.

What I recommend here as experiment, is the actual practice in EGYPT, where they sow all their grains, of whatsoever species, on the same day, that is, the first moment the retreat of the NILE gives them access to their land, just relieved from its annual inundation.

We have scriptural authority for the result, marking the progress each separate grain has made in the same time.

MOSES tells us, that at the time of a particular event, “the *barley* was in the ear, and the *flax* was bolled, but the *wheat* and the *rye* were not grown up.”

The experimentalist will now diversify his trials, and by sowing the same grain at different times, in many small plots, he will soon be able to determine how far, for the security of the young tendril, he can delay sowing, without throwing the mature plant into a season unfit for ripening its seed.

It has been made a question, whether in selecting our corn for seed, we should choose our weightiest pickle, or whether the smaller and lighter might not answer just as well; in other words, from which side of our winnowing heap are we to take our seed—the windward, or the lee-

ward? The fuller, plumper, and larger grain, will not cover so much ground as the smaller, and is also of higher price; hence by sowing the smaller and lighter grain, we should save considerably; and SIR JOSEPH BANKS is of opinion we may safely take our seed from the *leeward* side of the heap.

Were the question brought before the agricultural school, arranged as I suppose,—the *theorist* would tell us, that the farina constitutes the whole value of the corn; that this portion of the vegetable forms no part of its organic construction, has no connexion with the vital principle of the germ, but is merely a mass of unorganized matter, provided by nature for the sustenance of the nascent plant, until by its roots it can extract food for itself; that the farina in vegetables, corresponds with the yolk of the egg in oviparous animals.

Now we observe that in every thing connected with the preservation of species, nature is not only liberal, but generally profuse, and (no doubt to provide against difficulties,) often redundant:—besides, the provision was made when the vegetable tribe was left to propagate itself, without any of the facilities devised by man, which he now gives to assist vegetation, and increase produce.

More farina, it is obvious, would be required under the hardships of a state of nature; and a greater quantity will be formed under cultivation, as animals fostered by man acquire a degree of obesity, which they never reach in a state of nature; thus it appears the quantity of farina is increased, and the expenditure of it diminished; of course it is highly probable, we may with safety avail ourselves of the redundance, that is, sow the lighter, and consume the weightier grain.

The question is now brought before the experimentalist,

and one of the lightest he has to encounter: he need only sow a few small plots with seeds taken from the opposite side of the winnowing heap; and by a careful comparative view of the crops when ripe, he will be able to pronounce upon the safety of the measure, and by attention he will soon discover what he will gain by pursuing it.

The preservation of the vigour of our soils, and the reparation of the waste they sustain by our perpetual call upon them for crops, and consequent loosening of their texture by over-frequent cultivation, is a subject of vast importance, and has already excited much attention.

The mechanical mode is simple; to renovate and consolidate our harassed and open soils by mixtures of firmer materials; that is, compost formed of strong earth, or pure clay, well attenuated: but in loose, light, and sandy ground, such consolidating materials are rarely found; the agriculturist is therefore thrown upon his own ingenuity; and I know not any instance in which it has been more successfully exerted.

He has found, that by alternating what are known to be *exhausting* crops, with those that are deemed to be *meliorating*,—*culmiferous*, with *root* crops—*farinaceous*, with *green* crops—he has brought his ground to bear more constant pressure than it was supposed capable of sustaining; still the exhaustion, though much abated, is evidently perceivable, and the NORFOLK farmers complain their grounds are *TIRING* of their favourite turnip.

MR. GREGG, now become very eminent as a practical agriculturist, admits rest to be indispensably necessary, and recommends two successive crops of grass.

To make that rest as effective as possible, let us speculate *a priori*—Which are the grass crops that exhaust the

ground least?—which are those that will consolidate, and renovate it most effectually, and which, during the period of rest, will yield the greatest produce?

It is in adversity, when the vegetables he is cultivating are attacked by various disorders, that the agriculturist will find the benefit of the arrangement I have suggested, as it will enable him to meet with strength, and I may say, discipline, the difficulties he will have to encounter.

That the vegetables we cultivate should be subject to disorders, is to be expected; since it appears, that not a single one of them is a native of the climate to which we have introduced them, all transplanted from regions more favoured by nature, habituated to a warmer, and generally a drier atmosphere.

Thus then as the strangers we have transferred to our ungenial climate, have acquired disorders from which they were probably exempt in their own milder regions, it becomes the duty of the *naturalist*, that is, according to my arrangement, the *theorist*, to investigate the causes of these disorders, and to exert his ingenuity in devising remedies, to which the *experimentalist* is to give a fair trial on a small scale.

Many of these disorders, I apprehend, will be found to arise from *parasitic plants* attaching themselves to the one we foster, and intercepting its nourishment; others, I know, will be found to proceed from myriads of *microscopic animals* invading our plant, and forming their nidus in the most delicate and important parts of its structure; destroying its germ, or consuming and spoiling its farina.

Here the *theorist* will advise various alterations in the culture of the vegetable, and in the periods of sowing the seed; trying if he can discover what will be unfavourable to the *invader*, without injuring his grain.

Where the enemy is an animal;—as we have good reason to believe every animal (at least insect) has its own poison, the *theorist*, by diversifying the experiments he orders, may be fortunate enough to discover what will be injurious to the hostile insect.

Some of these are known to us, and (like the FLY so mischievous to our turnips) provoke the attack:—the slug, and cutworm, I find formidable enemies to our young *mangel wurzel*, and often oblige me to repair their depredations by new plants, and, as the season advances, to fill up the vacancies they have occasioned, by a quicker-growing vegetable, requiring the very same culture, — the *potato*.

That new enemies are pouring in upon us from the animal kingdom, is a fact too well known. MR. CLERK thinks the *mosquito*, the torment of the inhabitants of tropical climates, is advancing on our more temperate regions. The cyder counties in England are alarmed by the invasion of new animalculæ, hostile to their apple-trees; and the peach, for a century the luxury of ST. HELENA, which had proved a favourite soil and climate for that most delicious fruit, has been nearly exterminated in that island, by an insect imported from the Cape of Good Hope with the Constantia grape, but which seems to have considered the peach-tree as a more appropriate nidus;—the lamentations of the inhabitants on this unexpected calamity, are pitiable.

The most formidable of the disorders by which our crops are injured, and for which the most numerous remedies have been suggested, seems to be the SMUT in wheat; this too I suspect to arise from the depredations of animalculæ. The weight of the mischief requires unremitted exertions, and the steady co-operation of the *theorist* and

experimentalist: the former will suggest whatever occurs to himself, and he will make a list of the nostrums already recommended in our agricultural papers, even by the Grub-street gentry, who are very ready to obtrude them, as if they themselves, IN THEIR AGRICULTURAL PRACTICE, had tried them with success: any number of these experiments may be made on *one ridge* in a wheat field, without in the least disturbing the farmer in his process.

Steeping the seed in various strong mixtures has been often recommended, and is said to have succeeded. No doubt this is commencing very early; and the expectations are sanguine, that look, from medicating the seed, to affect the new germ nine months afterwards: still, however, the trial is easy, and the experimentalist is not allowed to pre-judge questions; but he should be most careful to mark the plots where his steeped seed is sown, to distinguish them from those where his plain wheat is sown.

Until some nostrum shall be discovered injurious to the enemy, let us try if by any variation in our present practice, we can strike out some process injurious to the invader, but inoffensive to our grain, and not affecting its produce.

We have many varieties of wheat, bearded, smooth, &c.: the *experimentalist* is to discover which of these is least liable to be affected by blight or smut; and having ascertained the proportions of their produce, he is then to decide, whether security from these disorders will be sufficient to compensate for some diminution of produce, admitting such to be the case with the new-chosen grain.

WHEATS have different periods of attaining their maturity: what the French call March wheat, is of quick growth, and is sown with us in February, on account of our more languid climate; or if our own earliest wheats were sown at later periods than usual, it is possible they may not afford

so good a nidus to the parasitic fungus, which my friend SIR JOSEPH BANKS has discovered to be the cause of *blight*, or to the animal or vegetable that produces the *smut* in our wheats, cultivated in the common way.

Among my earliest recollections, I remember the *Christmas dark* of the moon to be pronounced the best time for sowing wheat: I suspect my northern friends could not have justified their practice by sufficient reasons; but the experimentalist has nothing to do with reasons *a priori*; he has only to diversify his trials, and to report results.

I should be happy to see an intelligent agriculturist, when preparing a field of wheat, regulating the great mass of his practice by the common and safe rules, but dedicating *one ridge* to a variety of experiments suggested by his own good sense:—the expence would be nothing; the requisite attention from himself in many cases an acquisition; the scanty produce of his diversified ridge might be used in domestic consumption, so as not to create any mixture in the main body of his crop, whether intended for sale or seed.

Of all the grains we cultivate, wheat is the slowest in growth; whence, in order to bring its crop to maturity in an early season, in our languid climate, we are obliged to borrow from the preceding year, and sow late in autumn, and have thus a considerable period in which we may try experiments.

OATS, too, may be sown in the preceding year, and the speculation is plausible:—I have tried it more than once; the appearance was promising, but the birds, very numerous in this country, devoured my crop as soon as it coloured. Whoever wishes to try this experiment, should select the slowest growing variety of oats; and I recom-

mend for trial that species which produces its grain on one side like a feather: it is very late in ripening, likes a strong cold clay, and never shakes with wind.

The oat tribe seems more diversified than any other species of our grain, and, as it forms an important part of the food of the lower orders in many parts of the United Kingdom, well deserves the attention of the agricultural school.

A vegetable remains, probably of more value to man, than any other with which he has yet formed an acquaintance—I mean the potato:—the use of this excellent root is more extended than that of any other plant we cultivate: for, it not only affords a pleasant and nourishing food to man, and in treble the quantity he can obtain from any other vegetable he cultivates on the same area, but is equally well adapted to the sustenance of every domestic animal we keep, either for our own food, or for labour.

The field too, in which the potato may be cultivated, is more widely extended than that we deem adapted to our other favourite vegetables: every soil suits it, and we see it ascend to very considerable elevations, and we find it productive on our very wettest bogs, when sufficiently drained.

To the *agriculturist*, the potato is of the utmost consequence; for it is a meliorating crop, renovating and refreshing his exhausted ground, and effectually preparing it for whatever other crops he chooses it to be succeeded by.

To the *naturalist*, the potato is a curious subject for his attention. This vegetable has two distinct modes of propagation, by the root and by the seed: the former gives us an abundant crop of excellent food, while the latter, like the stones and seeds of our fruit-trees, gives us varieties, sometimes new, which never had been noticed before.

When we look to the potato, with respect to *political economy*, it will probably be found of more importance than in any other point of view I have considered it ; for, as this root is good food, both for man and his domestic animals, it is plain, that by speculating on it steadily, and more extensively as a food for the latter, we secure a resource for *ourselves* on a failure of our grain crops.

The most valuable property of the potato, is probably the facility of its culture on coarse grounds, hitherto untouched by man, which are thus brought within the agricultural pale, and in perfect preparation for other crops. How many hundred, I might say thousand acres, of SCROGG, have vanished from the face of my country in my own time ; by *scrogg*, I mean tracts covered with stunted bushes, marks of ancient woods, once occupying these grounds, which have never since been broken up. The labour of preparing such stubborn soils for grain crops, would be very severe, and the return intolerably slow ; but the labour expended in MAY, and even JUNE, in the culture of the potato on these wilds, is abundantly repaid in November.

Barren *peaty heaths* and *mountain* skirts are rapidly vanishing before the spade of the potato-grower, yielding him most valuable crops of the food he is chiefly sustained by. Deprive us of the potato, and see what a tedious and expensive process would be required to prepare the same ground for any farinaceous crop.

The consequence of the potato, in a national point of view, now appears ; it is the grand instrument for the further improvement of our islands. IRELAND shows, that by the aid of the potato, the spade of the peasant outstrips the efforts of wealth, and advances tillage to scenes which the powers of man could not have reached without the aid of this valuable root. The plough, we are told,

has not yet touched one half of the English area : with the potato for its *precursor*, how rapidly would the plough follow ?

I have dwelled so long upon the excellencies of this accommodating vegetable, that I shall not enter upon the question, to which the study of its *natural history*, *habits*, and *properties*, must give rise, in the distribution of the departments of the agricultural science I have made ;—the *theorist* and *experimentalist* must adjust these between themselves, having the double task before them, of making us better acquainted with the varieties of the potato we already possess, and also of discovering to us the *new* varieties of this vegetable, which nature has yet in store for us, to reward our industry and sagacity.

I have often complained that the agricultural science was left almost exclusively in the hands of PRACTICAL FARMERS and AGRICULTURAL BOOKMAKERS.

I now speculate upon the assistance and co-operation of a very different description of persons, whose zeal I hope to animate, and whose force I shall labour to concentrate, in pursuit of a favourite object, *the improvement of this useful and necessary science*.

In every part of the United Kingdom, I see AGRICULTURAL SOCIETIES formed, and in these the respectability of the contiguous country collected : we have thus every where assemblages formed of the friends of agriculture, and the well-wishers to its improvement ;—*talents*, *wealth*, *zeal*, and *liberality*, are embodied, for the avowed, and sole purpose of benefiting their country, by the advancement and improvement of this useful and necessary *science* or *art*, in which soever light we choose to consider it.

I am proud of having my name enrolled on the lists of many of those respectable societies ; I look up to these

incorporated amateurs as the source from which the perfection of this favourite object is to be derived; and I hope to be forgiven by them, for complaining, that notwithstanding their activity and good sense, the most effectual means have not yet been adopted of attaining their ends.

Instead of availing themselves of the *talents* which I know them to possess, and calling forth *their own energies*; they employ themselves in rousing those of others, and throw the whole business on a description of persons far worse qualified: they endeavour, by honorary and pecuniary rewards, to stimulate the *practical farmers* to make the experiments, and to decide the delicate questions upon which agricultural success depends.

They call upon indocile and prejudiced persons, who have each of them probably already formed their opinions upon these questions, and whose object will be to establish what they have already decided upon.

Let *agricultural societies* rely upon *themselves* and act for *themselves*.—I may be told they are tumultuary assemblages, incapable of acting, and of necessity must employ others; let them look to another tumultuary assembly, THE HOUSE OF COMMONS, and they will see the great mass of business of a mighty nation, transacted in the most complete manner by *themselves*; they will see their *committees* encounter the most intricate and delicate questions, with acuteness and perseverance, and deciding them in the most satisfactory manner.

The science of agriculture is of immense extent, beyond the powers of any individual, or even any body of men, to make themselves masters of the *whole* together: it must be divided into *departments*, before it can be encountered with any hopes of success.

Let me then suggest to the respectable societies already incorporated, to form each of them *committees of arrange-*

ment: whose office it shall be to distribute the great mass of the science into manageable parts or departments, and to assign to distinct committees, their separate portions of the great business before them.

The grand object of agricultural societies, and their committees, should be to investigate the natural history of the vegetables we cultivate, that we may become acquainted with their *habits* and *periods*, that we may apply the culture most likely to bring them to the highest state of perfection they are capable of attaining.

The varieties of each species, with their properties, the soils they affect most, their comparative advantages and defects, form most important subjects of inquiry; even the most cursory view will shew here is a source of full employment for many committees.

The reports of these committees when re-considered, and perhaps abridged, will compose a code containing a mass of information very different from what is now found in the numerous volumes of agricultural bookmakers, compiling from their predecessors, and from each other, with the sole view of forming a *vendible book*.

Another most important object, and well worth the attention of those respectable societies, formed with the hopes of benefiting their immediate countries, and of course mankind in general, is the inquiry—Can we add to the stock of vegetables we already cultivate, any others, likely to add to our own comforts, or to increase the facility of sustaining our domestic animals?

Of the great variety of vegetables we now cultivate, not a single one is a native of our own climate; the introduction of some is recent, as the *mangel wurzel*. The turnip is not of a century standing; and it is owing to this root that *Norfolk* boasts she now produces more food for man

than is grown on an equal area in any other part of *England*.

The *potato* is known but for two centuries, and little cultivated in England for more than one. The introduction of this valuable exotic into SCOTLAND is still later; and the beneficial effects it rapidly produced, are well authenticated in the report of the proceedings of the Agricultural Society of the STEWARTRY OF KIRCUDBRIGHT, presented to me when I had the honour of being elected a member of that respectable society. MR. MAXWELL OF MANCHES, a venerable gentleman of that country, born in the year 1720, had been requested to report, so far as his remembrance went, the state of agriculture in the Stewartry of Kircudbright in his early days: the whole of his report is very interesting; I shall take the liberty of transcribing the passage, where he mentions the introduction of the potato.

“ It is not proper for me here to narrate the distresses
 “ and poverty that were felt in the country in these times,
 “ which continued till about the year 1735:—in 1725, po-
 “ tatoes were first introduced into this Stewartry by WIL-
 “ LIAM HEYLAND, from Ireland, who carried them on
 “ horses’ backs to Edinburgh, where he sold them by
 “ pounds and ounces;—during these times, when potatoes
 “ were not generally raised in this country, there was for
 “ the most part a great scarcity of food, bordering on
 “ famine; for in the Stewartry of Kircudbright and County
 “ of Dumfries, there was not as much victual produced,
 “ as was necessary for supplying the inhabitants.”

That the spontaneous produce of the earth affords but scanty nourishment to man, at least in our climates, is obvious; nor would the cultivation of our indigenous vegetables add much to our stock of food: the early inhabitants

of our earth were thinly scattered over a widely extended surface, and poorly fed :

“ *Quippe aliter tunc, orbe novo, cœloque recenti*

“ *Vivebant homines.*” —————

And we ought not to reject as fiction what the poet tells us of our ancestors living on “ *glandes et arbuta*,” when we see the miserable state in respect of food, in which savages are often found.

The ingenuity of man, and his intercourse with his brethren in different climates, have discovered and communicated new sources of nourishment, which had long escaped notice ; and when HUMBOLDT saw the natives of the TENERIFFE Islands making bread of fern root, he exclaims : “ *How little does the finest climate and most fertile soil defend the lower classes of mankind from the most wretched poverty !*”

With a redundancy of food for centuries, our population has increased to an enormous amount, and notwithstanding the new sources, so numerous and various,—our supply of provisions sometimes falls short of the demand for consumption, and we occasionally feel those *scarcities*, I might almost say *famines*, to which our early ancestors were more accustomed.

————— “ *Cum glandes et arbuta, sacrae*

“ *Deficerent sylvæ, victumque dodenu negarat.*”

An history of the successive additions that have been made in many centuries to the vegetables upon which the human species and its domestic animals are maintained, would be curious and amusing ; and the contrast between our present modes of sustenance, and that to which the

early inhabitants of these countries was limited, would be most striking.

This is not idle talk ; it leads us to inquire if the resources of nature, although so heavily drawn upon, be entirely exhausted ; and if she has any thing left in store to reward the ingenuity and sagacity of man.

Could an intelligent committee have a more important department consigned to them than such inquiry?—At present it is no man's business ; but the moment it becomes a duty, active individuals will discover on what food the inhabitants of other climates are maintained : something new will often come out, to which it is a part of their office to give a fair trial.

Accident often I admit gives rise to the most important discoveries ; but should, at present, accident bring into the way of any man a new and promising vegetable, where is he to bring his discovery?—Is it to the practical farmer, proud of what he already possesses, and vain of his skill in the management of it? His maxim is :

“ *Quod sapio satis est mihi, non ego curo.*”
 “ I am for none of your novelties.”

Had such a committee as I suggest existed, would a deaf ear have been turned to DR. LETSOM? and would *mangel wurzel* have been thirty years making its way into the farms of practical agriculturists? Even supposing the latter to be less opinionated, and the members of the agricultural societies less enlightened than I assume, and believe them to be ; the question of the introduction of a new vegetable would come before these separate tribunals, under very different circumstances. The practical farmer would commence with doubts, and before he proceeded

would weigh the degrees of probability ; while the committee, whose object it was to increase our stock of vegetables, would deem simple possibility a sufficient ground to proceed upon.

If such a committee was established, many contributions would be made to it : whoever met with, in other countries, a promising vegetable, would be sure to see it get a fair trial at home.

I should be happy to see a committee also appointed to study our indigenous vegetables. I suspect they would afford us more resources than we are aware of ; I know not whether attention has ever been paid to the comparative values of our indigenous and foreign clovers.

I may say the same of the vetch tribe, for my late period of mowing gives some spontaneous vetches time to acquire a great and valuable luxuriance.

Another measure remains, which I earnestly recommend to all agricultural societies to adopt : that is, to take into *their own hands* a small piece of ground, to be used in trying the several experiments, which their committees will find it desirable to make ;—it is by experiments alone that valuable and useful information will be received. Ocular demonstration, too, may perhaps subdue prejudice, and stagger incredulity.

I have little doubt that *two acres* might be sufficient to answer every purpose ; but as agricultural societies are always liberal, and generally wealthy, I think it probable, that it may be desirable to extend the scale a little, as our experimental field will not only instruct, but will also afford great amusement to the members, and probably seduce them into a more skilful, as well as a more zealous pursuit of the science.

The grand committee of arrangement will state the several questions, on the decision of which, light may be thrown by experiment, and will assign them to subordinate committees. I shall not presume to anticipate any of them; but supposing a ridge of many small divisions, or compartments, to be assigned to the several varieties of the oat tribe; another to wheat, for the purpose of trying the efficacy of the several specifics that have been recommended, as preventives of the disorders to which that most important grain is subject, and by which its value is so often diminished;—let me suppose another ridge consigned to the untried vegetables of other climes, upon which man or his domestic animals are sustained in their native countries; another to the indigenous vegetables of our own, which hold out the most distant probability, or even possibility of repaying the expense of culture, or of being improved by it into value. What a mixture of instruction and amusement, would a walk in such a field give to agricultural amateurs? Their interest in the pursuit would be increased; they would become in some sort experimentalists themselves; and their suggestions would, no doubt, be attended to and deserve a fair trial.

PART II.

INTRODUCTION.

HAVING executed the first part of my promise, and considered Agriculture in a general, and in some sort in a scientific point of view, I shall now proceed to the remaining parts of my engagement, and describe the different fields upon which, with a view to their improvement, I propose to employ the industrious and unoccupied poor, whose present situation has so properly excited the attention of the BOARD OF AGRICULTURE.

The theatre upon which the labour and ingenuity of man may be exerted in the agricultural line, I consider as of two descriptions: The former, that which he has already broken up, and from which, by the due course of

tillage, he extracts food for himself and his domestic animals.

The second description is that which still remains in its natural state, though in the possession of man, and, without any labour on his part, yields him some produce for his cattle, far short indeed in value to that which he is used to obtain, by breaking the surface, and expending his labour and seed.

This description also includes other tracts, at present either nearly or totally unproductive.

The vegetables also by which his own wants and those of his domestic animals are supplied, are likewise of two descriptions :---the one, natives of more genial climes, which imported into our own, and long fostered with unremitted care, have afforded us so superior a supply, as to remove all necessity of cultivating our indigenous vegetables, not one of which is deemed worth the notice of the agriculturist.

The second description of vegetables, in-

cludes those which are natives of our own country, and indigenous to our soil, being the stock with which nature originally favoured us, as most suitable to our climate.

To the *latter* description of soil, and to the *latter* class of vegetables, I propose to limit myself;---satisfied that if I find abundant employment for the industrious and unoccupied poor, THE BOARD OF AGRICULTURE will not be displeased to find that it is to be on hitherto untouched ground; and that they will be gratified when they see the exertions they have taken such pains to call out, are to be expended in giving some value to grounds that never had any before, and in improving the produce of others, that had hitherto been but scanty. Nor, should these ends be answered, will the Board complain, when they find that the vegetables I mean to throw into greater luxuriance, are not descended from a foreign breed, but the *indigenous*, *aboriginal* occupants of our soil.

I do not mean, in any instance, to adopt

the common usage of tilling the soil, or breaking the surface, for the extermination of the plants in actual possession—nor shall I attempt to force Nature to throw up the crops I wish for, by obtruding their seed upon her, hoping to carry the same point by kindness and accommodation, by adapting the soil to the habits and likings of the vegetables I wish for, and thus tempting them to choose it, and settle on it.

The untouched domains of Nature, to which I propose to call attention, are detailed in the following eight chapters.

CONTENTS.

GRASSY MOUNTAINS.

These are to be made more valuable in three ways, to each of which a distinct chapter is assigned.

CHAP. I.

First, By making them produce winter food for all the cattle that graze upon them in summer.

CHAP. II.

Secondly, By making them habitable by man, and colonizing them with industrious manufacturers.

CHAP. III.

Thirdly, By improving their grassy sole, so as to make them yield more, and a better description of pasture, more grateful to the cattle that graze upon them, more nutritive, and more fattening.

CHAP. IV.

HEATHY MOUNTAINS.

These, under favourable circumstances, which are most abundant, I hope to make produce tolerable green pasture, in place of the useless heath now covering them.

CHAP. V.

NAKED SANDS.

These too I hope, in many instances, to clothe with a green sole, productive of some pasture, substituting a pleasant verdure in the place of deformity and barrenness.

CHAP. VI.

UNTOUCHED SURFACES IN ENGLAND.

A description rather scarce in that highly improved country.

CHAP. VII.

UNTOUCHED PEAT MOSS AND MOOR
UPPER SURFACE.

This extensive description I hope in many cases to improve considerably ; but I confess my expectations fall very short of what I have often seen promised on the subject.

CHAP. VIII.

CUT OUT MOSS UNDER SURFACE.

This disgusting and useless description of ground, I engage in almost every instance to make produce crops more valuable than what now grows upon our best and most highly manured meadows.

CHAP. I.

GRASSY MOUNTAINS.

HITHERTO, while the grand elevations by which our surface is so much diversified, formed the subject of my inquiries ; I considered mountains merely in a *geological* point of view, and hazarded my conjectures upon the operations of nature, by which they had acquired their present forms.

I shall now cease to look back to original formation ; but, taking a prospective view of the subject, I shall inquire—How these widely-extended tracts can be made more useful to man, and more productive to his domestic animals ;—whether the scanty food these wilds now afford to them at the best season, can be increased ;—whether these same mountains can produce, *in themselves*, storeable provisions to sustain their four-footed inhabitants in winter, while the powers of Nature seem torpid, and vegetation completely at a stand in these dreary regions.

It is here natural to ask—Have I discovered or imported any new vegetables, which yield greater produce in bleak elevations than their native plants are able to do ? Have I discovered any new culture by which the plants we foster will be thrown into greater luxuriance, than under those we have hitherto adopted ? No.—I shall avail myself of no other plants (that is, grasses) than those with

which Nature has already clothed the surface of our mountains ; and instead of introducing a new mode of culture, I shall not adopt any, nor break up in any instance the grassy sole I find ready formed.

A watchful attention to Nature herself, and to the habits of the spontaneous vegetables which she is perpetually obtruding on us, will enable us to apply the measures that will call into more vigorous action those whose produce is valuable, and to repress the plants which are useless, and of course injurious, by pressing on, and crowding those (the more kindly grasses) which, if at liberty, would luxuriate into higher value.

I shall generalize no longer, but proceed to the field of action, MOUNTAIN ; a description widely extended over many parts of our British islands ; so widely, that a facility of adding in any degree to the improvement of these tracts, would add materially to the wealth and prosperity of the British empire.

I may be told, this is not a time for engaging in speculations,—that the present distress pervades all ranks of society,—that the great mountain proprietors have suffered as severely as any other class, and are at this moment little able to raise the funds necessary for carrying on extensive improvement.

I rely, that the most important of the improvements I propose to commence with, are not extensive ; for, widely spread as a mountain grazing farm may be, it is but upon a very small part of it I mean to act ;—a park or meadow, of a very few acres, will be sufficient to supply a very large mountain farm ; and the cost of effectually inclosing such small area, will amount to full two thirds of the whole expense to be incurred.

The BOARD OF AGRICULTURE give a full answer to this objection, and, by proposing their premiums, show it

to be *their* opinion, that this is the most favourable moment chosen, for engaging in such improvements; CAPITAL is not required, and whatever is to be expended will be laid out in *manual labour* alone; and at this very moment we see great landed proprietors and other public-spirited gentlemen, as well as that honourable Board, exerting themselves to create employment for the industrious but distressed labourers and manufacturers, at present thrown out of work.

How then could such unfortunate and suffering people be better relieved, than by applying their labour to the *permanent* improvement of the country, by engaging them, by contract or daily labour, in the formation of those enclosures I shall mention, and in the execution of the other more diminutive works I shall point out.

Our GRASSY MOUNTAINS are chiefly employed as pasture, and in that view alone I shall at present consider them;—stocked with many flocks and herds through the summer, not one of which they are able to sustain through the winter, or even should a few starvelings be left, half of them perish from cold and want of food.

Hence the winter sustenance of the mountain stock must be sought for elsewhere than at home, or they must be disposed of at low rates, to the inhabitants of milder regions, who contrive means of sustaining them. Thus it appears, the great desideratum in mountain pastures is *winter food for their cattle*.—Teach their occupants to raise provender within themselves, and so to maintain their stock at home, through the winter, and you increase their profits, and of course the value of mountain lands, tenfold.

This is my present object; and I hope to show that this important point may be carried at light expense, and in a short time, that is, in the very first year in which the necessary operations are commenced early, and with spirit.

I had long observed, that great elevations did not repress the luxuriance of *some* grasses; and a few years ago, I persuaded my noble friend the MARQUIS OF HERTFORD, to make the experiment on a scale of seven acres, on his own mountains, at an elevation of *nine hundred feet*; and the success was complete. My worthy friend SIR CHARLES ROSS laboured to seduce me to ROSSSHIRE, and probably would have succeeded, had not our speculations been stopped by his untimely and much-lamented death.

Further observations smoothed the difficulties in the way of mountain meadows, so as to reduce them nearly to nothing. I now discovered that our *agrostis stolonifera* formed a component part in all elevated green soles, and that its proportion to the other grasses with which nature mixed it, increased as the elevation became greater, and the severities they had to sustain more weighty.

I had previously discovered, that even in low ground, where circumstances were favourable, (that is, where, by the nature of the soil, some difficulties were thrown in the way of spontaneous common grasses,) that by severe weeding, draining, top-dressing, and late mowing, I could convert the natural mixed sole, without breaking the surface, into pure fiorin meadow, of great value and permanent continuance.

I did not venture to bring forward the hardy paradox, until my friends SIR J. STEWART of COLTNESS, SIR A. MACKENZIE, and COLONEL LOCKHART, member for Selkirkshire, transmitted to me a document, well authenticated, establishing the existence of a portion of pure fiorin meadow of great value, though quite spontaneous, in Colonel Lockhart's plantations; small indeed, but sufficient to prove, that under circumstances, fiorin could of itself take possession of the surface; nor was Colonel Lockhart's a solitary instance that reached me.

Determined now both to establish the truth of this position, by irresistible evidence, and also to show its easy application to use;—in February, 1815, I requested my noble friends the EARLS OF CALEDON and GOSFORD, to inspect a poor coarse piece of ground never broken up, promising their Lordships, that if they would be so good as to call again late in October, they should see the same ground, (48 English perches) covered with a crop of hay of superior quality, and double the quantity of any other crop grown in Ireland that season; without breaking the surface, sowing or planting florin, or performing any other operation than *surface draining, weeding, and top dressing*.

My two noble friends, and many other persons of respectability, attended in February 1815; and, fully satisfied of the wretchedness of the 48 perches I laid off before them, were much amused at my promise of producing a double crop on that same portion within the year.

The two Earls attended again in November, each accompanied by friends; and I observed them impressing on these strangers, the poor state in which they had viewed this ground in the preceding February, but now covered by a crop (different parts of which were mowed before them,) that their Lordships authorized me to say, seemed treble the amount of those they were used to see cut. The crop of 1816 yielded above thirty tons green sward to the English acre, and now (June 1817,) the third crop seems to promise better than either of the preceding.

Having thus established the power of changing a spontaneous grassy surface, into most luxuriant florin meadow, at little expense, first by experiment on a small scale, and afterwards with much publicity on a far more extended one; and then having carried this new measure into actual practice with complete success, I shall recur again to the principles upon which it depends; point out

the grounds fittest for the purpose, and then proceed to give such instructions as I conceive will be useful.

The measure of changing a *natural, mixed, grassy sole*, into a pure fiorin sole, is founded on the assumption, that in every grassy surface, undisturbed for three or four years, there is a mixture of *agrostis stolonifera*; and I have invariably found the quantity of this agrostis, proportioned to the difficulties it had to encounter. At Portadown, GENERAL CARR and I found, that after seven months submersion, the emerging verdant sole was pure fiorin: a hard gravelly bottom precluded the aquatics; and other grasses would have been drowned.

I showed EARL O'NEIL, that the sole of an old turnpike road (now shut up) was pure fiorin, and offered to throw it instantly into a rich crop.

Walking afterwards with his Lordship in a weak moory part of his estate early in August, we observed a tenant mowing a poor spritty meadow; I told his Lordship he was cutting it quite too early.

I went over the ditch, and having examined it, called his Lordship and showed him great abundance of young fiorin stolones running among the sprit: his Lordship persuaded his tenant to listen to my advice, and abstain from mowing for a long time.

Some weeks afterwards his Lordship informed me, that his tenant had been obliged to cut his meadow, which had improved far beyond his expectations; and I have no doubt, had he abstained some weeks longer, his meadow would have more than double the quantity it had produced when I stopped him.

It is in the harshest parts of low regions alone, that we can expect to succeed in converting a mixed sole into a pure fiorin one; should we select a *rich*, or even a moderately rich surface, in a low country, however well stocked

by nature with the true agrostis, the rush of intruders would be such, that no efforts in weeding would secure the exclusive possession to our favourite.

Why then do I boast of having succeeded in my own low country? Because I used policy: I selected ungenial spots, long loaded with undischarged water, become acrid about the roots of the plants growing on it; poor and stunted; fiorin as well as the rest. I first changed the nature of the ground by severe surface drainage, and enriched it by top-dressings. The paltry aquatics in possession derived no benefit from the change; Nature had not adapted them to such a soil; while the amphibious fiorin, finding itself in its own favourite soil, instantly rushed into luxuriance, smothering its rivals by the mass of its stolones;—nor this without a struggle, calling for my interference, as some of the old possessors, like fiorin, reconciled to the change, started up into vigour requiring occasional extirpation.

The management of spontaneous elevated soles requires no policy. Fiorin, as I have often proved by respectable testimony, confirmed by my own ten years' experience, luxuriates equally at the *top of the mountain* and *bottom of the valley*.—Not so the rivals it has to contend with in lower regions. Every one of these shrinks from, or pines under the severities of an alpine climate; and should I be called upon to except sprit and rush,—I reply that these coarse intruders soon disappear under drainage and top-dressing; nor need the mountain-meadow maker take the trouble of inquiring which of the portions he is able to select, is best stocked with fiorin by Nature; he may rely upon it, there is not a spot in which he will not find abundance before him.

There are indeed other circumstances of importance to be attended to; the roots of fiorin penetrate a very short

way into the ground ; whence we might infer, that this grass would agree with a very shallow soil :—by no means ; on the contrary, I never found it permanently luxuriant, except in very deep soil. My worthy friend the late **BISHOP OF LLANDAFF**, with his usual ingenuity, discovered the cause ;—an important secret which agriculture, in all its branches, owes to that venerable prelate. His Lordship told me, that there was a *perspiration* from the earth highly favourable and encouraging to vegetation ; weak where the soil was shallow, but powerful where it was deep ; and these positions the Bishop confirmed to me by the most conclusive experiments.

Our field is ample ; mountain grazing farms are widely extended ; and as a very few acres of meadow will suffice for *all* the cattle in winter, that were maintained on it in summer, we have great room for selection, and in the variety of surface shall surely find a sufficient area favourable to our purpose ; nor am I hard to please. Much of the green mountains I have traversed, are of the following description—peaty soil, from nine to fifteen inches deep, fibre decomposed.

This is a very good description, especially if the substratum be clayey, so as, when reached by the drains, to afford a material that will improve the peaty compost ; should the peat be graduating into moor, and either by decay or mixture with earth be unfit for fuel, I consider this soil as still better.

Where there is not peat, alluvial clay or earth is very favourable ; and where the ground is spouty, generally sufficiently deep, a point to be carefully attended to ; and in general I would choose wet marshy ground, for the drainage is cheap, and most productive of soil for compost, when drains are frequent.

Where the peaty soil is fibrous, we generally find it

covered with heath; but even were the surface *grassy*, I do not like to encounter a fibrous soil; nor have we any necessity for engaging in difficulties, for few mountain grazing farms will occur, in which suitable sites for meadows will not be found, in far greater abundance than can be required.

Many, no doubt, will start at the thought of finding luxuriant meadows at great elevations; I have already touched on this subject, and shall add a few words for the encouragement of timid gentlemen.

In my geological pursuits, I have for many years been in the habit of ascending every mountain I came near; and from the time I discovered fiorin, I have always looked for it wherever I went; and *affirm*, that on every mountain I went up, I found fiorin more abundant the higher I ascended; and at the summits of the two highest, BESSY BELL and KNOCKLAID, I found no other grass.

My friend the EARL OF SELKIRK, on his return from a visit to me, was to pass near KNOCKLAID, and intended to go to its summit; I requested his Lordship when there to look for fiorin;—he wrote to me, that he had found it in abundance at the very top, and carried some roots home with him.

At the request of the IRISH FARMING SOCIETY, I went to the summit of the ridge above Dublin, separating that county from Wicklow; I was accompanied by some members of the Society:—as we ascended, we found spontaneous fiorin every where, but, to our surprise, more vigorous as we approached the summit. I pointed out this curious fact to the gentlemen who accompanied me, and who entirely agreed with me in my mode of accounting for it; which was, that in the lower regions, fiorin had rivals to contend with; but these, unable to bear the severities of great elevation, could not exist beyond a certain

altitude, above which, florin unincumbered with rivals became, when in exclusive possession, more vigorous.

What then is the object of this part of my memoir? Is it not to induce the proprietors of mountain districts, in the most favourable parts of these regions, by *drainage*, *manure*, and *protection*, to encourage the growth of a vegetable, which we have demonstration will thrive and luxuriate in the bleakest parts of the same regions, without any one of these aids?

But however well florin might sustain the harshness of the mountain tops, it can never be desirable that our meadows should approach them; for when I talked of great elevations, MR. CRITCHLEY, who at the request of the Farming Society attended me in the tour I made through the Wicklow Mountains by their desire, showed me, that from convenience, our meadows must always approach the inhabited country, and be near to the dwellings of the herds who were to attend to the feeding of the cattle in winter, and distributing their stored provisions with care and prudence.

The measures I recommend for raising crops of excellent hay through all mountain tracts are little expensive, as will appear by my detail of the whole of them: effectual protection is necessary, consequently strong inclosures; and these constitute the principal part of the expense.

Nor will there be any delay in the execution, if set about with spirit; crops will rapidly follow, and the interval between commencing the work, and mowing the produce, will not extend to one full year. The EARL OF CALEDON's patch, as he calls it, was begun late in February, 1815, and yielded its great crop that same season. On the 14th of May, I began to lay down an acre for my friend Mr. BAIRD, at SHOTTS, in Scotland, and that same season he mowed a better crop than had ever been cut in the country.

The progress of the improvement I suggest, if extensively adopted, would not be gradual; for should incredulity be suppressed, and a confidence in me substituted in its place, and acted upon, the change in the value of the mountains in the British islands would be instantaneous.

Bacon tells us, that man and Nature execute their operations very differently. Man commences with parts, finishes one, and then proceeds to another, and so on till the whole be completed. Nature, on the contrary, commences with the whole, advances all the parts uniformly, finishing none, until the whole be completed.

Hence, it appears, that should I be seconded as I wish, the promise I made to some of my Scotch friends would be performed; and every mountain grazing farm, from CAITHNESS to DUMBARTON, enabled to sustain through the winter the whole stock that had grazed upon it in summer.

Having stated the principles upon which the conversion of a green sole of grass into valuable meadow depend; having detailed *generally* the measures to be adopted; and having by various and most respectable testimonies established the success that has attended them on different occasions, I shall proceed to the immediate object of the BOARD OF AGRICULTURE, and show how extensively the *industrious* and *unoccupied* poor may be employed in carrying these measures into execution.

In the selection of the ground to be converted into meadow, depth of soil is an important consideration; I wish it not to be less than *twelve*, or at least *ten* inches deep; to a *peaty* soil I have no objection, provided it be not *fibrous* and *spongy*.

The only operation we have to perform on the area chosen, is to relieve it effectually from all under water, and to enrich the surface by good top-dressings.

The former point we carry by frequent open drains, parallel to each other; their distance governed by the nature of the ground; if the subsoil be retentive, they should be the more frequent and deeper, not less than fifteen inches, and in the form of an *equilateral*, or perhaps a *right-angled* triangle, that they may not be easily choaked up; and also that they may be readily cleared when necessary: the stuff raised in the formation of these drains is to be thrown into tall heaps, their distance from each other governed by the power of the labourer in pitching.

For top-dressings, our resources are most abundant; the heaps I mention are upon the spot, and when improved, only require to be thrown by the shovel on the contiguous surface.

Our sources for this improvement are *two, lime and ashes*:—the former may be deemed expensive; but as this manure is created entirely by *manual labour*, whether we look to the *quarrying*, the *burning*, or to the *raising* of the fuel; making lime and finding uses for it may be considered in some sort as forming part of the object of the Board of Agriculture, *finding employment for the industrious and unoccupied*.

Should the objection be still pressed, I reply, that the very smallest quantity will be of value to me; and should that be refused me, I can do very well without the article.

Ashes form a grand and inexhaustible source of manure, at least for my purpose; these are also procured by *manual labour*, for peat and moor, or peaty earth, are most abundantly disseminated through *all* our mountains, and easily converted into ashes; whose quantity may be greatly increased by adding *earth* or *clay* to the fire, or kiln, we employ.

For burning ashes, mountain is an excellent situation,

so airy that the combustion is easily excited, and the fires kept up even in wet weather ; the cheapness with which this valuable article will be furnished, is scarcely credible.

Lime and *ashes* both possess a quality extremely convenient in the formation of composts, great *divisibility*; and by this, can also be spread pure on the surface, in whatever proportions we can afford, with corresponding advantage.

I dwell on these two descriptions of manure for several reasons: I know of no other that can be procured in quantities commensurate to the immense extent of surface I propose to embrace. Ashes are to be made *every where*; for the peat of our mountains is inexhaustible; and PLINY asks, “ *Quoto enim in loco non suum marmor invenitur?* ” I have the fullest experience of their successful application to the use for which I now recommend them;—I have repeatedly ascertained the extreme cheapness with which they, at least ashes, are procured: and they are the principal instruments upon which I depend, for enabling me to fulfil the bold promises I have made, and both procured by manual labour alone.

Though they both can be administered *pure*, it is upon the composts enlivened by them I chiefly depend.

We left the bases of these composts, the *prime material* from which they are formed, in small heaps on the edges of the drain we had opened; our object now is to enrich and to make them *friable*. For the latter purpose, when they shall have stood some time to dry and mellow, we throw every two contiguous heaps into one; and as we break and mince them small, we throw in some shovelfuls of well-powdered lime, regulating the quantity by the facility with which it is to be procured.

When these second and larger heaps shall have stood a

reasonable time, they are again to be turned; and now during the operation, *ashes* in as great quantities as we can afford are to be thrown in.—Should the material raised from the drains be loose or peaty, the compost will very soon be sufficiently friable; but should the subsoil be *viscid* or *tough clay*, (materials I like) they will require a third turning; and in this case I wish for as much lime as convenient, reluctantly dispensing with it: but in loose and more open materials, pure ashes, if profusely bestowed, will be abundantly sufficient; and with *fair, good*, top-dressings of this compost, so easily made, *I engage* to raise from SUTHERLAND, by the skirts of BEN NEVIS and BEN LOMOND, SKIDDAU and SNOWDON, and finally far up, on DARTMOOR, crops of hay of superior quality, and *double* the quantity of what is now raised on the best meadows in MIDDLESEX, with the aid of London dung.

As our drains are the sources of our composts, so happily placed as to be spread on the surface without *portage*, it may be convenient to increase their size beyond what is immediately necessary for the discharge of the water; and also to make them more frequent than we should otherwise have done.

Our desire of obtaining more material for our compost will be increased, when we find it well adapted to our purpose, *deep viscid loam or clay*;—in this case, I should not hesitate to make the drains *two* or *two and half* feet deep—still equilateral triangles.

I cannot generally pronounce on the distance between the parallel drains, it must depend on the depth and tenacity of the subsoil; nor is parallelism *essentially* necessary;—to discharge the water is the object, and inequality of surface may make a deviation desirable.

The frequency of my drains has been objected to, as

occasioning loss of surface ; important where the ground sets high. I reply, I gain surface ; for the stolones, by their propensity to run down declivities, soon make the sloping sides the best part of the meadow.

Our material for forming compost, may also be got on the outside of our strong inclosure ; but this depends upon local circumstances.

When we have selected our area, we should commence by lighting fires ; these will be kept up by the men employed in making the drains and fencing the meadow ; and as I never break the surface myself for the purpose of cultivation, I will not allow it to be broken up *by paring for burning*.

As the *immediate* object of the Board of Agriculture is to find employment for the industrious and unoccupied poor, I fear the very slight operations I require to be performed, are so trifling in themselves, and so speedily executed, that they will be deemed insufficient for the purpose, and as not affording the occupation required.

I admit, that when we compare these labours with those that in the common course of cultivation are expended on equal areas, we shall find the employment afforded by these new measures to occupy much fewer hands.

And when we compare the great profits to be derived from them, for which I am pledged, so far to exceed those usually made by similar exertions of manual labour, I fear I shall be deemed to have failed in my engagement of *finding employment for the industrious and unoccupied*.

But when it shall be considered, that the exertions I propose to call out, require not either *previous preparation* or *weighty capital*, and that they may be employed in an infinite number of places at the same time ; I expect that the complaints of my not finding sufficient employment for

the industrious and unoccupied poor will be abandoned ; more especially when it shall be recollected, that no labour has as yet been expended on the grounds I select ; nor probably ever would, had not I pointed out the measures that will make them valuable, by the pure exertion of *manual labour*,—the very article now so loudly called for by the world, and the particular object of the BOARD OF AGRICULTURE'S premium.

CHAP. II.

ON THE COLONIZATION OF UNINHABITED GRASSY MOUNTAINS.

IN the preceding Chapter on the *improvement of Grassy Mountains*, I limited my views solely to their present inhabitants, the cattle that graze upon them; pointing out measures by which these mountains might be enabled to maintain their cattle, at seasons when NATURE is torpid in such elevated regions, and, ceasing to produce food for these, their sole inhabitants, lays their proprietors under the necessity of either selling them, or removing them to other countries where food can be procured for them.

I shall now consider these regions in another point of view, and show that by a judicious application of the same measures, those extensive uninhabited tracts may be made the seat of a numerous population, enlivened by *Agriculture*, and enriched by *Manufactures*.

Before we speculate on extending our agricultural field, and adding to the number of our manufactures, it may be proper to take a short view of these two interests, the *agricultural* and the *manufacturing*, jointly and sepa-

rately. I live in a country where every farmer is also a manufacturer, and if not personally employed, yet, scarcely with any exception, has manufacture in some form carried on in his house. Such has been our practice for more than a century; and the result has been, that with the weakest soil, and from the most thinly inhabited part of IRELAND, we are become by far the most populous, our cultivated field bears a greater proportion to our whole area than in other provinces, and we have carried tillage farther up our mountains, and reclaimed more of our bogs than will be observed in any part of the kingdom.

Hence, I confess, I am prejudiced in favour of the usages to which I have been a witness in my own immediate country; and in my plan for domestic colonization, wish to assimilate the measures to those which I see attended with complete success.

I know it to be the habit of many wise ones, to condemn the union of agriculture and manufacture as injurious to each other, and I have often listened with impatience to lectures on the prudence of keeping these two arts distinct from each other; for, say they, when united, neither can attain the perfection to which they would arrive separately; and I have heard the inferior style of our practical agriculture brought in proof of the position, that the union is injurious.

I have often taken the other side of the question, and admitting the *agricultural* produce of a given area, divided into small farms, to be decidedly inferior to that of an equal area laid out in greater farms, and more skilfully cultivated, yet still I have sustained, that the whole produce, including manufacture, afforded by the mass of

the small farms, was of more actual value than the pure farinaceous crops of the more knowing farmers.

The state is decidedly on my side of the question; for even were the value of the whole produce of each area only equal, it would be enriched by the superior number of inhabitants, the most important part of its wealth consisting in its population.

This topic is well illustrated in a pamphlet published in PHILADELPHIA during the late war, and held in much estimation in ENGLAND: it says—"It is admitted by most writers on political arithmetic, that one thousand inhabitants collected within a square league, will, when compared with five hundred spread over the same surface, sustain much more than double the amount of taxes, and cost much less trouble and expense in collecting them." And again: "War as waged by BONAPARTE is not now principally a question of finance, but of the resources of population. The strength of a state opposed to FRANCE, must be estimated by the sum of its population, divided by the extent of its territory."

We have been repeatedly advised to collect our manufacturers into towns, and to leave the country exclusively to the agriculturists. We well know that we should not improve the morals of our people by collecting them together into such masses; and recent experience proves that the tranquillity of the country, and even of the state, may be endangered by bringing numerous bodies together, so as to be within the grasp of factious demagogues, zealous to inflame them into outrage, sedition, and rebellion.

When vast numbers, especially of very young persons,

are collected together into great manufactories, we well know their morals are corrupted, and their character debased; of this we have too many proofs. Indeed, it is a necessary consequence of their new situation; for, removed from domestic society, and the mild influence of parental authority, they naturally take the turn of that company they fall into, and the worst description generally takes the lead.

The proportion of our manufacturing, to our agricultural and commercial population, is by far too great; and it might be desirable, if practicable, to reduce it: but, exclusive of the difficulty, I fear the state to which we are reduced, after a tremendous contest of unparalleled duration and enormous expense, would not bear an alteration that might diminish our resources. When, therefore, I speculate on increasing or manufacturing population, I have no thoughts of separating it from the agricultural; no thought of carrying off the children from their father's house, or depriving them of parental care and instruction: they shall continue to dwell together in patriarchal innocence. Manufactures can be found, in which the children have employment at their own fire-side; and while the father bears his part, or rests from the labours of his diminutive farm, as of old;—

“ Arguto conjux percurrit pectine telas.”

In cottage industry, as well as in great manufactories, employment is found for very young children: the sisters, as they advance, take to their wheels; the brothers to the loom; and sometimes we see a loom in a corner occupied by a journeyman. Such is the picture of most small farm-houses in the North of Ireland: but domestic industry is

not limited to the linen manufacture, which may be overstocked; perhaps is so already by the interference of cotton, and abatement of demand.

The judicious proprietor, when he speculates on colonizing his wilds, will coolly consider what manufacture is best suited to his local circumstances, and likely to have a permanent demand. As he will not disturb his sheep or remove them from his mountains, his own wool holds out an inducement to commence with the woollen manufacture: nor is he limited to his own crude materials; others may be found, easily imported, and to which the industry and ingenuity of man can give such additional value as to make the trade highly profitable.

It remains for me to show how these speculations, so advantageous both to the state, and to the local proprietor, may be carried into effect, at a cost not beyond the reach of our present contracted means, and an immediate employment found to the industrious and unoccupied poor.

In my former Chapter, on Grassy Mountains, my object was limited to the provision of *winter food* for their *summer stock*. I did not look forward to human inhabitants, nor carry my views beyond the cattle themselves now in possession; nor was I careful as to the elevation of the small tracts upon which I wished to operate, leaving the proprietor to consult his own convenience, ready to attend him to whatever altitudes he might think fit to ascend. But when our object is changed, and we look to a settlement for human inhabitants, where, by their own industry, they may extract from the soil their own food as well as that of their domestic cattle, we must take care not to carry our colony into regions, where the powers of Nature

are inadequate to these purposes—to elevations too great for the production of the vegetables necessary to sustain our new inhabitants.

The limitation we are now under is merely, that we advance upon ground not yet occupied by man ; but we will surely choose the mildest of the description, that is, the skirts of the mountains, and the most favourable vallies, where we can find a depth of soil suitable to our objects, and not encumbered with undischageable water, nor too deeply loaded with spongy peat moss ; a description abundantly scattered through all the mountains I have traversed, and amply sufficient for an immense number of inhabitants, though perhaps covering but a comparatively small portion of the whole area of our alpine regions, every where exhibiting immense tracts of shallow stony surface, and a still greater portion elevated above the zone where esculent vegetables can be cultivated.

I may be told I am speculating on sending inhabitants to people our mountains, at the very time we see the **HIGHLANDS** of a neighbouring country depopulated ; that it is probable our efforts to establish colonies, will only be the means of producing emigrations, similar to those we have lately witnessed, and which have been so generally deplored.

Before we propose to stock uninhabited mountain tracts with colonists, it is necessary to inquire, how other mountain districts came to be forsaken by those who, born on the spot, were probably descended from the aborigines of the country, and yet, forgetting their attachment to the soil, emigrated from the habitations of their ancestors. For similar causes produce similar effects ; and less powerful ones

would induce strangers to forsake a new settlement, than would be sufficient to compel old residents to quit their native homes.

The inhabitants of the Scotch Highlands, at least those who have emigrated, were all pastoral tribes; they *cultivated* very little of their soil; their flocks and herds supplied some of their food, and the profits of their cattle were the source from which their rent, their necessities, their comforts, and any of the few redundancies they may have had, were supplied.

As the population and the wealth of the nation increased, the prices of every thing gradually rising, these profits became greater and greater. The landlords observed this, and soon saw that they themselves might enjoy these profits; that the cattle grazing on their mountains required very little attendance, and that by throwing many of these small grazing farms into one, a far higher rent might be obtained for it; or the landlord himself might stock it, (as was often done) and thus carry on the grazing business at his own suit to great advantage.

The inhabitants thus reduced to their diminutive *cultivable* farms, scarcely able in an ungrateful soil to produce sufficient food, and totally deprived of all means of procuring other necessities, or of making their rent, were soon reduced to the greatest distress. The alternative before them was, that they must either strike out new modes of raising the means of supplying themselves with necessities, or they must emigrate from a country where they could no longer exist.

Here then those who form plans of colonization receive

a good lesson; they must consider not only, how their new inhabitants are to be supplied with food, but also what sources they have, whence other necessities and comforts are to be supplied.

The bleak countries, to which we are about to ascend, are not favourable to agriculture: moderate exertions may procure sufficient produce for domestic consumption; but it is from *lower* and *richer* soils, that markets are to be supplied, and funds raised to reward the labour of the agriculturist.

Domestic manufacture seems to me the only resource for our new colonists; and the proprietor must be well prepared on this subject, and must have effectually secured domestic occupation for them, before he ventures to transplant them; otherwise he may be certain of seeing his colony soon deserted.

What this domestic occupation is to be, I leave to those to determine who have more knowledge in such matters, and who may be acquainted with the local circumstances of the country in question. I shall content myself with showing how the necessities which the soil can produce are to be procured. I shall not mention fuel, because the regions I look to generally abound with turf; and no proprietor would think of a colony, where a copious supply of that article of prime necessity was not under his command.

I shall now assume the proprietor of a mountain district to be determined to establish a colony in his wilds, and to avail himself of his own means to induce settlers to repair to it. He builds for each a comfortable cottage,

with a small cow-house. He lays off for each a very small farm, and engages to give summer grazing for one, perhaps two cows, with some immediate assistance necessary for new settlers. Admit them to arrive; how can they proceed? The new colonist cannot maintain his cow in the winter, for he has not hay; he cannot till his small farm, for he has not manure;—and as he cannot avail himself of what alone his landlord can give him, his domestic industry, whatever it may be, cannot reach so far as to supply his entire food, his other necessities, and also to pay his rent—he must of course soon migrate.

A very little attention to the preceding statement will show, where the progress of our alpine colony was arrested. Winter sustenance for the settlers' cows was not provided; hence no source of manure.

HAY, no doubt, is the grand desideratum in all highly elevated countries. The knowledge of this induced me to compose my preceding Chapter, on the *improvement of Grassy Mountains*, in which I limited myself to the production of HAY alone; and as I conceive I have fully established the facility of forming, at a trifling expense, most productive meadows in all parts of such mountains, I shall not repeat what I have said, but, merely referring to that Chapter, I shall at once assume the practicability of forming luxuriant meadows wherever we please, by the simple operations of *draining*, *weeding*, and *top-dressing*, with cheap and contiguous materials, as I have there more fully detailed.

The proprietor, having now taken me into his council, resumes his operations; and as he commences the building of the cottage, he at the same time incloses—suppose

one acre—for a fiorin meadow, which, if managed as I have directed, will produce an abundant crop the *first* year; and if properly attended to, will continue its luxuriance I know not how long—perhaps for ever, but I can only answer for eleven years.

The tenant is now arrived, and things proceed very differently. The landlord, no doubt, fosters him a little, until the powers of his small farm are brought into action, and its produce able to maintain the family.

The first winter, his well-fed cow (perhaps two) gives him milk, and manure follows, with which in **MAY** he plants **POTATOS** as far as it goes: this is followed the ensuing year by a small crop of **RYE**, or **OATS**. New ground is broken up for potatoes the next year; his tillage field of course is extended, until it reaches the limit his landlord is pleased to set to it. **BLACK OATS** will probably be the variety he will select,—as more hardy, as of quicker growth, of course ripening sooner, so as to escape the blighting early frosts of the ungenial climate. Black oats too, less disposed to lodge than the white, will agree with his potato ground, which he probably can enrich further, by burning some ashes on contiguous peaty soil. The facility of raising potatoes by the manure of their cattle and ashes, will enable the colonists to rear pigs; a source of food, and perhaps profit.

To speculate on our mountains, as a new field for cultivation, will no doubt be deemed wild; but in these alpine tracts, I look upon agriculture rather as a secondary consideration, subsidiary to the maintenance of the inhabitants; **MILK**, as with his pastoral ancestors, an important part of his food; potatoes also a serious addition;

and we know this valuable root will thrive at very great elevations : his demand for farinaceous produce will thus be moderate, and easily supplied by the *rye* and oats immediately following his potatoes, whose strongly manured, and well prepared ground will yield tolerable crops, even in this unfavourable climate. It will be his landlord's policy to restrain his agricultural speculations, by limiting his farm.

Four, perhaps five acres, without including summer's grazing for his cows, may be abundantly sufficient, including his meadow. He will have no more labour to perform in the field than what will be a relief to a sedentary manufacturer ; of course the attention of himself and family be little diverted from domestic industry.

What extensive tracts of grassy mountain and moor have I passed through in IRELAND, in the North of ENGLAND, and above all in SCOTLAND, admirably adapted to these speculations : but the incredulity of man is a more formidable obstacle to improvement, than any resistance thrown in our way by Nature ; and as the position *that a natural sole of grass in ungenial soils and harsh climates, can at once be thrown into a more productive state, than the highest cultivation of man can bring his most favourite grounds to*, is both so extraordinary and SO NEW as to justify unbelief, I have taken pains in my former Letter to establish the position by well-attested facts ; and now, as the success of the proposed plan of colonization depends entirely on the truth of the same position, I shall state another strong and well-attested fact.

I had by previous correspondence, and afterwards in

person, on his grassy PEAT LANDS, taken much pains to teach Mr. Young, of Harburn, the culture of fiorin grass, in my usual way, by tilling the ground, and planting stolones. Last year, Mr. Young, with much exultation, reported complete success. I replied, that I had of late changed my measures, and did not now break the surface of grassy mountains. Mr. Young's answer was very important; he told me he had taken with him, on receipt of my letter, to his new meadow, MR. BAIRD of Shotts, a gentleman well skilled in the cultivation of fiorin, who had obtained in 1815 the highest fiorin premium, and whose crop appears on the records of the HIGHLAND SOCIETY to be far greater than any ever raised in GREAT BRITAIN, unless by the COUNTESS OF HARDWICKE. These gentlemen reported, that a stripe of Mr. Young's meadow had not been broken up, and that upon this they found a good crop of spontaneous fiorin; and Mr. Young now lamented, that he had broken up any of the meadow. This decided success followed protection alone. Had the stripe got a light top-dressing, the crop would have been much finer; and it is probable the contiguous fence, or drain, relieved it from water.

The establishment of a colony will give various employment to the industrious and unoccupied; for, in addition to the formation of meadows, houses are to be built and roads made, that the colony may be accessible with convenience.

CHAP. III.

GREEN PASTURE MOUNTAINS.

MY speculations for the employment of the *industrious* and *unoccupied* poor, in the improvement of their country, have in two preceding chapters been limited to the formation of MEADOWS. In the *first*, for the winter maintenance of the numerous herds and flocks that graze upon them in *summer*; and in the *second*, for the winter maintenance of the cows who are to supply with milk the colonists and manufactures I hope to establish in these wilds.

I now proceed to new measures; still affording ample employment to the *industrious* and *unoccupied*; but with a different object in view;—the improvement of these pasture grounds, *as such*.

I have hitherto limited myself to select portions and diminutive patches, operating upon these alone; but now I embrace the whole area, excluding only such parts as are not of sufficient promise to encourage us to expend our labour upon them. I have as yet also limited myself to one grass, the *agrostis stolonifera*, diligently extirpating every other as it appears. But where pasture is my object, I make no selections; I avail myself of the assistance of all grasses.

“*Sponte sua quæ se tollunt in luminis auras.*”

As pasture grounds have at all times afforded suste-

nance to such immense numbers of cattle, in many countries the sole support of the human species, it may be deemed rash to trust the maintenance of these domesticated animals, in so many cases our sole resource for our own food, to the precarious supply of provisions spontaneously afforded by unassisted nature.

It seems also to imply great want of ingenuity in those concerned in agricultural speculations, that they have not devised means of improving our pastures, to enable them to supply the increasing demands upon them, made necessary for an increasing population.

Such seems to be the opinion of my friend SIR HUMPHRY DAVY, who complains, “ that very little attention
“ has been paid to the nature of the grasses best adapted
“ to permanent pasture ; perhaps pastures superior to the
“ natural ones, may be made by selecting due proportions
“ of those suited to the soil.”

My able friend is not satisfied with mere complaint; in the true philosophical style, he encounters the question *à priori*, and exerts his chemical skill to investigate the characters and properties of the several grasses, from which he may form a reasonable judgment of those that are most likely to afford the best pasture to our cattle.

This was the object in view, when the laborious suite of experiments was instituted at WOBURN by the noble proprietor, and in which this eminent chemist so fortunately joined ;—yet with such associates, with the patronage, the liberality, and the great agricultural skill of the DUKE OF BEDFORD, the experience and persevering diligence of Mr. SINCLAIR, it is mortifying to give up a pursuit so strenuously sustained.

NATURE is against us, and has rigidly limited the powers of man, and will not suffer him to interfere in the formation of a *permanent* sole of grass.

To clothe our surface with a verdant coat, seems a favourite object of Nature, and for the most beneficent purposes : but she will execute it in her own way, and by the mixture of a prodigious number of vegetables ; so many, that M. ST. PIERRE tells us, all the research and diligence of man could not give the complete natural history of *all* the spontaneous vegetables contained in one square perch of ground.

Let us, by breaking the surface, and by severe tillage, exterminate every one of these vegetables, and sow the mixture of grass seed we think most desirable ; yet, though they should all vegetate the *first* year, they will soon vanish, and we shall find, in two or three seasons, the surface occupied by the same mixture that Nature usually produces in such soils, and our labour completely thrown away.

My first agricultural pursuit was to discover how to form the best permanent sole of grass ; and twenty years before I laid off the gramina as a peculiar department for myself, I made it a point to dedicate a small portion of every field I laid down to such experiments, and to try both mixtures, and *one* variety of grass, in small plots.

The first year, the produce was true to the seed ; in the second, the varieties sown were little predominant, and in the third not to be found.

Many years afterwards, accident gave me the same result in a more extended and more decided manner.

Investigating the natural history of the several varieties of grass, I made many plots, not less than fifty, sowing them with all the different kinds, and by attentive weeding for four years, keeping out all mixtures. At length, having obtained the information I sought for, and given it to the world, I ceased weeding ; and in two or three years could not distinguish in any plot, the predominance of the va-

riety that had so long occupied it; all assimilated to the contiguous meadow, and were not to be distinguished from it.

Are we then to give up the attempt to form such a sole as we would prefer, or to improve a sole already established? or is it beyond our power to change the poor and unkindly grasses with which spontaneous nature has stocked it, for others more nutritive—now (thanks to SIR HUMPHRY DAVY) that we know them?—By no means. But we must pursue different measures from those my ingenious friends speculate upon. We must not attempt to force Nature, and carry our point by violent alterations;—we must conciliate her by kindness. We must improve the soil which we wish to see clothed with a more kindly description of grasses; and we must change it from a state favourable to the production only of coarse, sour grasses, and weeds, into one favourable to the production, and encouraging to the growth of more kindly and more nutritive grasses.

It has been generally supposed, that spontaneous Nature clothes our surface with the vegetables, and particularly with the grasses, best adapted to the soil in which they are to grow. But an attentive observer will soon discover, that this is not her usage; on the contrary, that she sows an indiscriminate mixture of grasses on *all soils*. Of these, such as suit the soil they fall in, come forward in health, while the grasses ill adapted to it fail off and scarcely appear, yet generally preserve their existence.

If these positions, the result of many years' diligent observation, be well founded, it is *upon the soil* we should operate to change its produce, without troubling ourselves to change the grasses, over which we have no power.

Let us take a cool and careful view of our extensive pasture grounds, especially our mountain districts; let us try if we can find any very common description of soil,

which we know to be unfavourable to the production of kindly pasture.

I answer for it, such description will perpetually occur to us, and to the greatest extent;—I mean, that where an impervious substratum, stopping the passage of the atmospheric waters downwards, oversaturates the upper stratum, the vegetable soil, where it remains and becomes acrid, injuring the roots of the grasses that are placed in it, and derive their nourishment from it,—this undischarged water occasions our grassy surfaces to yield a scanty and unkindly produce, to fail in their verdure, and to give up every effort to continue their vegetation early in autumn.

The fact is, the kindly grasses can scarcely exist in so ungenial a soil, leaving the possession of the surface to the unkindly amphibious tribe, or coarse aquatics.

I am thus brought back to the very same measures I recommended in the two preceding chapters, for the formation of spontaneous meadows:—relieve the roots of your grasses from this noxious water, by frequent shallow drains; stimulate your surface by a sprinkling of animating material, pure or in compost; and the unkindly tribe in possession, now placed in a soil not suited to their nature, will pine and decline, while those more grateful to the cattle, long barely existing in the ungenial soil, so soon as it is changed into one more suitable to their nature, will take the lead, and come forward with improved luxuriance and verdure.

These *theoretical* speculations of mine receive the happiest confirmation from the result of a recent experiment, sufficiently pregnant with important consequences, were its own immediate object alone to be looked to.

I have in my first chapter dwelt sufficiently on the experiment I had made under the inspection of my noble friends the Earls of CALEDON and GOSFORD, on the

formation of valuable meadow, without breaking the surface. I here looked only to *meadow*, and that from the produce of *one solitary grass*, carefully extirpating all others.

It is from the operation of weeding that I derive the information I consider as of so much importance; for the greater part of the intruders upon me is the COCK'S-FOOT, and the weightiest share of my labour is to extirpate this grass, on all other occasions my greatest favourite.

I was well acquainted with this ungenial piece of ground, always in meadow, and for thirty years had never observed a single panicle of cock's-foot in it; but so soon as the nature of the soil was changed by the simple operations I so often detail, this valuable grass emerges from its obscurity, and presses forward to occupy its share of a surface, now made congenial to its nature.

Several years ago, I had recommended *cock's-foot* as the very best grass for pasture, assigning my reasons; to wit, that it possessed three qualities that make a pasture grass valuable, *earliness*, *luxuriance*, and quick powers of *reproduction*, after being eaten down. *Cock's-foot* also stands high on Sir Humphry Davy's list, as yielding much nutritive matter.

Is it then unreasonable to expect, that the *same operations* will produce *similar* effects on other grounds; and that when we relieve *them* from water, and enrich their surface, that spontaneous cock's-foot will spring up in our mountain pasture, as well as in our cold, wet, low-land meadow, though this most excellent grass had never been seen in either before?

I may be too sanguine in my expectations, that this most valuable of grasses will instantly obey our call, and enrich our mountain pastures, so soon as we shall have prepared the soil for its reception; but *I know* that a total change in the herbage will most rapidly take place, and

that whatever may be the varieties that *now* come forward, they will be kindly and grateful.

I have in the two preceding chapters detailed the measures for discharging the waters and enriching the surface : they are precisely similar to those that will be required for *mountain pastures* ; but with this important difference, that in the latter we are relieved from the expense of weeding and inclosing.

Whether after so very considerable an abatement of expense, we can look forward with prudence to the encounter of these boundless tracts, is a question that deserves the most serious discussion ;—but what occasion have we to look to the magnitude of the whole, when the improvement of one or of a few acres brings with it a certain value by itself, without inducing any necessity of advancing one step farther ? Let us recollect, that whatever improvement we make in this way is *permanent* ; our pasture ground, so far as our exertions reach, amended *for ever* ; and the proofs of our success or failure unequivocal : for if we change the nature of our soil, we change the colour of the sole ; and the contrast between the original surface and that operated on as I have directed, will in a very few weeks be most striking.

We shall soon have other unsuspected testimony : shall we, as I promise, change the sour unkindly grasses, now occupying the surface, into others more grateful to the cattle grazing upon it ; they themselves will instantly discover the more desirable food, select and dwell upon the spots. Shall even their actual preference escape our view, in the short visits we may make to our mountain pastures, we shall find they have left unequivocal proofs behind them, distinguishing and pointing out the favourite spots they had preferred, and dwelled longest upon.

It would be very desirable to ascertain what it would

cost to improve a given area by the process I lay down ; for although the expense of my small drains might soon be determined, the number of them required is perpetually varying with the nature of the ground.

ASHES, our grand fertilizing material, *I know*, in favourable ground (and all moory mountains are such) will not cost more than threepence per cart-load.

I am unwilling entirely to give up *lime*, it is so encouraging to the kindly grasses, and particularly to the smallest of the clover tribe, known to be most grateful to all cattle ; and the certainty of such herbage instantly following lime, is well known by the experiment perpetually made, of scattering some lime on a *peaty mountain*, to show that the place will immediately be covered with white clover.

How far we can avail ourselves of this costly material in our great area, is for the *experimentalist* to determine ; he is, by trying different quantities of this most divisible manure, to find what is the smallest quantity that will produce a sensible effect, and then the actual reclaimer must consider if even this quantity be within his reach ; while we know that *ashes* alone, at threepence per cart, will give, pure or in compost, a good stimulating top-dressing on very reasonable terms.

Is not this the moment for us to ascertain all these doints?—whether our cold wet grassy mountains be actually capable of receiving a considerable degree of improvement?—and whether that improvement is to be attained by the measures I recommend?—and whether these can be executed at an expense that will be amply repaid by success ?

Calculations and estimates before-hand, often prove erroneous when they come to be tried, and the expense resulting very different from what was promised : let us

try a mode in which we cannot be misled as to expense; but be able to calculate it with precision before we commence.

Let the great proprietors of *grassy mountains* relieve their distressed tenants, by employing the *industrious* and *unoccupied*, in executing such operations as I recommend, whether under the name of experiment or actual practice I care not; let them send parties of ten or twelve, properly governed, into different parts of their wilds; let them point out the commencement for each, and desire them to proceed according to my directions. After such a time as the proprietor can afford to employ them, he tries what work they have each executed, and he knows to a shilling what he has expended; he can judge whether the prospect of valuable improvement held out by me be realized; and whether, when the present stimulus of finding employment for the poor be over, it is worth his while to continue the same operations, with no other view than that of the benefit he is to derive from them. Shall he determine it is not, he has at least the consolation of knowing, that every shilling he has expended on my speculations, has been divided among his own industrious tenants, and that he has better bestowed it, in giving *employment* with it, than if he had distributed it among them *gratis*.

CHAP. IV.

HEATHY MOUNTAINS.

FROM green pasture mountains, I proceed to a much wilder description, whose improvement has as yet scarcely been attempted; and this seems the moment for experiment, when, in addition to the prospect of valuable improvement from our labours, we know through *the Board of Agriculture*, that the devising occasion for calling labour into action is deemed laudable; and of course, should unfortunately our speculations fail, yet the employment found by them for the *industrious* and *unoccupied*, may fairly be considered, *at this time*, as some abatement of the loss sustained by the expense incurred in an unsuccessful attempt.

I have sanguine hopes that our efforts will not be unsuccessful, and shall state my reasons for expecting that parts at least of these dreary, *unproductive* wastes, may be made of *some* value to their proprietors, in place of their present nullity.

Our field is immense, and of very different description, graduating from grounds sufficiently encouraging, into *impracticability*, and even *inaccessibility*. But it is not to this wild extreme we are to look, nor are we to argue from its horrors: the whole field is our own; we have the option of its most favourable parts; nor need we look forward to spe-

culate how far we shall be able to proceed ; the contiguous, and most promising parts, even in case of complete success, will long give employment to our most spirited exertions.

In my plan for improving *heathy mountains*, I look no farther than to their conversion from *useless heath*, to *grassy pasture* of some value ; nor can this be deemed a hopeless scheme, as we often see green mountain pasture mixed with the heathy, and often, even of more considerable elevation.

Our task is then to investigate the cause,—why nature in the one case prefers a vegetable useless to man, or his cattle ; and in other cases, at the same, or a greater altitude, throws up grassy produce of considerable value ;—and to inquire, can we operate upon the surface so as to make the soil a more favourable matrix for the gramina, and a less favourable one to the heath?

In my former chapter, I have gone sufficiently into the subject of the *grasses* which we mean to encourage, and shall now proceed to the natural history of **HEATH**, whose extermination is our object.

In addition to the power which **Heath** possesses of sustaining the severities of great elevation, it seems endowed by nature with another important property, that of bearing with much *wet*, and also with the alternations of *drought* and *moisture*. From the latter, it is adapted to a peaty soil, whose open spongy texture exposes it to such alternations ; and thus we find it nearly in exclusive possession of such soils at all elevations. **HEATH** is also a species of timber, a tree in miniature ; its solid woody texture requiring years to attain their full growth, and totally different from the succulent vegetables, which, whether annuals or perennials, lose in the winter, the whole *growth* and *form* they have acquired in summer.

This last character is important, as it implies slowness of growth, and consequent difficulty in recovering possession of the surface, after extermination, or even serious injury.

Before I proceed to avail myself of this knowledge of the nature of heath and the habits of the grasses I mean to substitute in its place ; I shall quote one strong instance, in which this substitution actually took place, without any previous intention of transferring possession from *heath* to the *gramina*.

Some twenty-five years ago, the MARQUIS OF ABERCORN attempted to form a plantation near the conical summit of his mountain, BESSY BELL : an acre was inclosed, the peaty surface dug, and of course the heath exterminated.

Being on a visit to his Lordship, fifteen or sixteen years after this acre had been planted with forest trees, and then having taken up the *gramina* as a department ; and observing, at about a mile distance, the strong contrast between the verdure of this small spot, (as it appeared) and the brown heath every where surrounding it, I ascended the mountain, to make observations on the effect produced by operations at so great an elevation.

I found the young trees all quite dead, except the alders, which were making weak suckers from their roots ; that the *heath* had not resumed possession ; that some varieties of grass were there in tolerable good health, particularly the *agrostis stolonifera* ; but that the growth of these grasses was much impeded by a profusion of moss or fog, choking them up :—anxious to give the *grasses* fair play on such disadvantageous ground, I requested his Lordship's agent, who accompanied me, to send up some men with rakes to destroy this fog, which was done ; and three years afterwards, when I paid another visit to BARONS-

COURT, I found the green patch at the top of the mountain, far more splendid than when I saw it before.

The circumstances attending this acre are most encouraging: the elevation was very great—an height to which it cannot be necessary to ascend, until the improvement on the skirts and lower regions are executed to a vast extent. The *heath*, once exterminated, had not attempted to resume possession; the *gramina* had come forward of themselves, without the encouragement we can so easily hold out to them by draining and top-dressing.

Let us then avail ourselves of the lesson taught us by my noble host, and, with the object more directly in view, take the necessary steps for converting the russet surface of our mountain into a more cheerful green, and for making what is now unproductive, *valuable*, as well as beautiful.

I proceed to describe the soils we are to select, having an option on which we shall commence our operations, small at first, but which I hope we shall soon receive encouragement to extend widely.

A characteristic feature by which peaty soil (more especially when spongy) differs from our common soil, is its facility of absorbing a great quantity of water, and also of parting with it; hence light boggy soils are subject to the extremes of *wet* and *drought*. To such violent alternations Nature seems to have enabled heath to accommodate itself, while they are fatal to all the vegetables we cultivate, as well as the grasses. We must therefore avoid *spongy FIBROUS soil*, and select the firmer peat, common in all mountains; as the turf we cut for fuel, at considerable elevations, is far superior to what we obtain from our lower mosses.

We commence by exterminating the old possessor, *heath*, by the best means we can devise, fire or spade; indeed, we often can pull them up by the roots, by hand. If the

surface be unequal, we must bring it to a coarse level, striking off with the spade the small rising tammocks, and tufts of heath, which when dry will assist us greatly in lighting our fires.

Our following measures are exactly the same as in the case of grassy mountains:—discharge the waters, enrich the surface, and *invoke Nature* to stock it with excellent food for your grazing cattle; and I pledge myself she answers your call.

It is not easy, *a priori*, to *determine* the distance at which the drains are to be cut from each other; discharge of the water is the object, and this must be done *effectually*. I should guess eighteen *feet* to be a good distance, and eighteen or twenty inches the depth of the drains. Their angle (the vertex down) should be *obtuse*, or at least a *right* one, to prevent the tread of cattle filling them up; and the greater the width at the top, the more stuff we raise. This is the source of our fuel for ashes; and as we raise it, we should dispose it for drying, that we may kindle our fires as soon as possible.

If in sinking we reach the substratum, its material will probably be much more productive of *ashes* than the pure peat, and of course very valuable to us: nor should we hesitate to sink our drains deeper, for the purpose of obtaining a great quantity of combustible material; for the more we enrich the surface, the surer we are of grasses springing up and clothing it.

We light our fires in the intervals between our drains, and when burned out, we spread the ashes on the spot with shovels; and I think would do well to rake them lightly into the very upper surface.

These operations are in themselves slight, neither *capital* nor previous preparation requisite. Shall the proprietors of *peaty mountains* even deem my speculations *plausible*,

what a field do I open for the employment of the *industrious* and *unoccupied* ! The very experiment will afford much, without opening a source of fraud and imposition. Let the proprietor employ a party, from six to twelve, of his distressed tenants or neighbours. He points out to them the field for their exertions, the fountain of their present relief, and I hope the theatre of his own approaching enrichment. He puts this party into the hands of a discreet person, with the above direction of mine as the rules they are to be governed by. He orders them to commence, and proceed *one, two, or three* weeks. He then examines the area they have brought within this new pale of improvement. He pronounces whether, at this *ascertained* expenditure, he has done enough for an experiment ; and, in proportion to his confidence in *me*, and his zeal to find employment for the industrious and unoccupied, he will stop to await the result, or he will venture a few weeks more, and perhaps increase the number of his parties of labourers.

The success will by no means be equivocal ; his operations have changed the *brown* surface of his mountains *into black*, and he must wait with patience for the next season of powerful vegetation, to see if nature has answered his call, and is proceeding in her usual way to clothe his *black* surface with a *green* sole. I envy him the pleasure he will feel, when he observes the nascent grasses appearing gradually, and occupying in succession the favourable soil he has prepared for them ; and I anticipate the exultation with which he will, from a distance, point out the contrast between the splendid glow of his own area, and the sombrous gloom of what still remains in the possession of its old occupants, the heath.

CHAP. V.

NAKED SANDS.

THERE is another field of vast extent open to us, upon which I am not without hopes, that a thorough acquaintance with the *habits* of the grassy tribe may enable us to make some impression, and that purely by the aid of the same associate NATURE, upon whose assistance I show in the preceding chapters I have so much reliance, and who, I expect, may be induced to commence her favourite operation of clothing our surface with a verdant sole of grass by some slight melioration of the present surface, through means not beyond very moderate powers.

This field is of immeasurable extent, and far beyond the reach of human exertions to make an impression upon it that will bear any sensible proportion to its magnitude, or even when viewed by itself be of very considerable extent ; yet I have hopes that in the most favourable parts of it we may rescue some small portions from the barrenness, and desolation, which it at présent exhibits.

I mean the *naked sands*, often loose and blowing about to the great injury of the contiguous grounds, too often reduced by the agency of the winds to the same sterile state with its dreary unproductive neighbour. Indeed, we have good reason to believe, that such sandy deserts, already occupying so much of the surface of our globe, have been

long on the increase, and have made mischievous encroachments on the habitable and cultivable world.

In our own islands, the blowing sands in the **HEBRIDES**, and even in some parts of the main land of **SCOTLAND**, have in the memory of man committed extensive depredations; and in Ireland, in the north of **DONEGAL**, we have still remaining, the walls of a house begun by a **LORD BOYNE**, standing in the midst of a sandy desert, the surface of which is now on a level with the second story of the building.

I have not hopes, that by any interference of ours, or by any style of cultivation, we can entirely arrest the progress of such desolating clouds of sand; but there may be cases of less violence, where, under favourable circumstances, the ingenuity of man may devise means of clothing the surface, so as to prevent the loose materials from being blown over other grounds, to their injury and ruin.

Let us remember, that, if we can clothe our sandy surface with a grassy sole, we carry two important points; we arrest the loose sand made mischievous by every stirring wind, and we create a valuable grassy surface where nothing was produced before; for we know the diminutive varieties of grass that occupy such dry soil always to afford a most kindly pasture.

Let those who start at the wildness of my projects, recollect that this is the moment for experiment; that though our hopes of success may not be very sanguine, yet, shall we make the trial, one result is *certain*, that the proprietor lightens the distress of his unfortunate tenants, and that whatever expenditure he chooses to encounter, his money is disposed of in the most charitable manner, in finding employment for the industrious and unoccupied poor.

It remains for me to show, that my speculations are not

so wild as they may at first appear ; that the idea of converting barren sands into kindly pastures, is not suggested by the pressure of the moment, and by the mere wish of giving employment to the poor ; for it had years ago occurred both to myself and others ; and is now brought forward as subsidiary to the exertions of the Board of Agriculture, as one measure, among others, by which employment may be given to the industrious and unoccupied poor.

Some six or seven years ago, being on a visit to my friend EARL O'NEIL, his Lordship pointed out to me some naked sand hills, which injured the view from the front of SHANE'S CASTLE ; and, as he knew *grass* to be my department, asked me if I could make these little hills green.

We went to examine them, and found every where, though most thinly scattered, detached roots of the agrostic tribe, with two or three poor stolones issuing from each. I observed to his Lordship, that as this grass grew there spontaneously, and preserved its existence in such poverty, that by enriching the surface a little, we must both add to the number of roots and increase the length of the stolones ; and that having thus formed the *commencement* of a sole, a great number of diminutive grasses would soon start up and form a perfect sole, both verdant to the eye, and yielding some very kindly pasture.

Where is the material to enrich the surface with ? Burn ashes in the contiguous moor, sprinkle the surface with this divisible material, harrow it in lightly with a bush ; and you not only meliorate the surface to encourage it to be productive, but you change the very loose texture of the sands, and by forming them into a sort of *paste*, make them less liable to be disturbed by the wind.

The idea of clothing naked, and even blowing sands by

means of the stolones of my favourite agrostis, occurred also to another gentleman, well acquainted with the inconvenience occasioned by such a moveable surface.

Two years after my intercourse with Earl O'Neil on the subject, being in Edinburgh, I was told by my kind host MR. AINSLIE, that a Mr. Brown had requested to be introduced to me, for the purpose of consulting me on a question relative to grass, which he considered as of much importance.

When Mr. Brown came, he told me he had been extensively employed in managing estates in the LEWIS ISLANDS, where great injury was done by the moving sand; that he had observed in many spots and patches, the sand held down by a grass running its shoots along the surface; that he had returned lately from the main, and, hearing much of fiorin grass, had been shown some, and immediately recognized the long-stringed grass he had seen in the *Hebrides*, holding down the sand: that his object in seeking an introduction to me was, to request my opinion on the practicability of *cultivating* this grass on loose sands, where he had observed such beneficial effects from its spontaneous growth. I gave Mr. Brown my opinion decidedly on the practicability of the measure, with full written directions as to the mode I thought he ought to pursue; and I promised to communicate further with him by letter, when he should apply to me. Not hearing from him, I wrote to my friend to inquire about him, and found he had got into employ in a part of Scotland not troubled with blowing sands.

With Mr. Brown I did not limit myself, as in the former case, to the spontaneous efforts of Nature, for clothing his surface, and arresting the progress of his mischievous enemy. I advised him, very late in August, when the stolones had acquired strength enough for vegetation, and

were also in the greatest abundance, to scatter as many of them over the surface as he could afford, and then to throw some shovelfulls of sand over them; hoping that until they exerted their vegetative powers, and actually rooted in the sand, they would act *mechanically*, and by their long strings entangle the sand, and increase the difficulty of disturbing it.

I advised also, *in his Islands*, to gather such sea-wrack as would not make kelp, and, having previously suffered it to ferment a little in heaps, to make it dissolve more readily, to scatter it over the surface, both with a view to enrich it, and also as in the former case to entangle the sand.

Although I had on all other occasions decidedly forbid the propagation of this agrostis by *seed*, on account of its slowness of growth, and the certainty of its being choked up by intruding rivals; yet I advised Mr. Brown to try *seed*, of which this grass is very productive, secure that, at least in this field, we should not be disturbed by rivals; nor was I so anxious about the species of grasses that should grow on this untried soil, as to get any thing to vegetate, and aid by its roots to fix the loose sand.

I have, in this and the preceding chapters, laid open fields of immeasurable extent to the ingenuity and industry of man; the magnitude of the areas should not discourage us, for it is not to their magnitude our efforts are to be proportioned. Let us endeavour to advance a little upon their peripheries, and thus:

“*Oras magni evolvere belli.*”

I must repeat, that where pasture is our object, as in this and the two preceding chapters, we have great encouragement. We are relieved from many previous operations; no inclosure nor even weeding necessary; we press directly to our point, and operate immediately.

Let not grave agriculturists, in the excess of their wisdom, pronounce at once on the folly of these measures. No doubt I may be too sanguine ; but before these solemn gentlemen take upon themselves to arrest proceedings, I intreat them to take a cool view of the subject.

The question is, can we make any advance in improving certain wilds of vast extent, and in rendering them of *some* use to man?—to such extent as he can each, and particularly at this time, when he has got so powerful a force in his hand as the Board of Agriculture wishes to find employment for? Is this question to be decided *a priori*, and in the negative, by pompous wisdom?—Or are we, even doubting, to try practicability by experiment, on a small scale and at trifling expense?

CHAP. VI.

UNTOUCHED SURFACES IN ENGLAND.

I HAVE often lamented, that the *agrostis stolonifera*, whose hitherto unknown value I had taken so much pains to press upon the world with so much success, had not made the same progress in ENGLAND as in other countries, and had in so many instances been received with coldness, and more than doubt, of the great acquisition I had boasted it to be to the agricultural world; and I had determined, and even declared my intention of giving up both hopes, and attempts, to establish its culture South of the TWEED.

Some recent circumstances have changed my determination; the cause of so many failures has been ascertained; the ENGLISH *agrostides*, which I persisted too long in assuming to be the same variety with the IRISH, are *proved* to be of varieties decidedly inferior to the *Irish* in luxuriance; and, as I have great reason to believe, much less furnished with *saccharum*.

My noble correspondent the Marchioness of Salisbury had early given me a caution on this subject, reminding me of the great inferiority of the English IVY to the Irish; but my too great confidence in the similarity of the productions of Nature in latitudes so nearly the same, made me incredulous.

The variety that comes forward spontaneously in DEVONSHIRE is mostly the *agrostis vulgaris*, as his GRACE OF BEDFORD was so good as to inform me; and my friend MR. PRESTON, M. P., assures me, that in his plantations the *agrostis vulgaris* is to the *stolonifera* as three to one.

The other circumstance that induces me to resume my efforts to establish this valuable grass in at least *some* parts of England, is the flattering attention I have received from the BATH AGRICULTURAL SOCIETY, whose worthy President SIR BEN. HOBHOUSE has done me the honour of transmitting to me, the last volume of the Transactions of that respectable Society; by which I find the subject has been treated with the greatest attention: and I have no doubt, the memoirs there published by SIR I. COX HIPPISELEY, and the REV. W. B. BARTER, who was honoured by the Society with a premium for his successful cultivation of fiorin, will stimulate others to partake of the advantages deriving by their neighbours from the introduction of this new vegetable.

Industrious and *unoccupied* poor, are as abundant in ENGLAND as elsewhere; and, it is probable, the more immediate object in the contemplation of the Board of Agriculture. MOUNTAINS are more thinly scattered over the Southern than the Northern parts of the island; and it is mostly on highly elevated districts that I have found employment for the unoccupied.

When I descend into the low country of ENGLAND, I lose my grand coadjutor, severity of climate; and here too I find there is a rival, the *agrostis vulgaris*, already in possession of at least the more Southern part of the island.

Can I find no other ally, but elevation? no other severities, but those of climate?—I think I can. *Cold, moist, moory*, and *peaty lands* are unfavourable to agriculture; and I pointed out to my friend MR. CURWEN, as we tra-

velled through CUMBERLAND, considerable tracts of this description, that never had been broken up; and we agreed, they were well adapted to *fiorin culture*, for then I was not aware of what spontaneous Nature could do.

These grounds were generally covered with a *grassy sole*, no doubt chiefly *our own agrostis*; for I met with it every where in CUMBERLAND as abundant and as luxuriant as in IRELAND, and the *agrostis vulgaris* never obtruded itself upon me. Here then we have a wide field, even what I saw; and I hear the same description is extensively spread over the *North of England*; and their never having been broken up, proves that the proprietors deemed them unfit for agricultural purposes. Can we then change these weak pastures into rich meadows? What a stimulus do we give to the agriculture of the better parts of the country? We greatly reduce the price of hay, and thus enable farmers to keep more cattle to labour their lands better, and to make more manure.

This description too has generally a *cold* retentive bottom, and is saturated with undischarged water, exactly the same case with much of the grassy mountains, and fitted precisely for the same measures I have dwelled upon so much with respect to them. The same severe surface-draining and plentiful top-dressing, must produce the same effects: the rapid change from a poor soil to a rich one, from a wet, to a dry one, would (as I have so often seen) throw the native *agrostis stolonifera* into high luxuriance, and repress the aquatics, now the chief possessors. More careful weeding would probably be required, as we have not *severity* of climate to aid us in combating intruders.

I have no personal knowledge of England South of Cumberland; but I have no doubt there must be other tracts in their low countries, adapted to the measures I

have recommended, and by them affording employment to the industrious and unoccupied.

I have long looked wishfully to the ENGLISH FENS, and have often shown to gentlemen connected with LINCOLN and CAMBRIDGESHIRE, and particularly to EARL ST. GERMAINS, a rich florin meadow, so low that its surface *never* rose more than twelve inches above the level of the perpetually stagnant water: no other crop that I am acquainted with could have been advantageously pursued on such low ground; yet my seventh crop is now promising well upon it. I am indeed particularly careful to extirpate nascent aquatics; but I know too little of the English fens to press the subject.

I expect that, as often in my own country, the fen or bog passes into a firm soil by a slow gradation, leaving a broad belt of *flat moist soil*, little elevated above the adjacent bog or fen, and which, when opened, would show the stagnant water at the bottom of the drains, and probably at a greater distance than the twelve inches I mentioned. The perpetual discharge by these, would prevent the water from over-saturating the soil, and becoming acrid about the roots of the plants; such description, if it exists, is no doubt covered with a grassy sole, and would of course be well adapted to the preceding measures. The vicinity of the water would, I am confident, prevent the obstruction of the *agrostis vulgaris*, while it would not injure our amphibious *stolonifera*.

DEEP ALLUVIAL BOTTOM occasionally submerged, would be far more productive in this way than in any other. I should hope that upon such grounds the *agrostis vulgaris* would not obtrude, and occasional submersions would not injure my crop, *standing or cut*. Very frequent drains indeed will be required to let off the water *rapidly*, and to

keep it as far distant as we can from the surface and roots of the grass.

Attentive and persevering weeding will be found particularly necessary on such low moist meadows, most productive in coarse aquatics; but this drainage, and weeding, more severe and requisite here, will occasion *more labour*, and secure employment to the industrious and unoccupied.

An interesting field remains in the *South of England*, to which my attention has been more than once called in the most flattering manner.—I mean DARTMOOR mountain, in DEVONSHIRE.

The liberality of the ROYAL PROPRIETOR to the BATH AND WEST OF ENGLAND Agricultural Society, excited their gratitude, and roused their exertions, to attempt the improvement of this most ungenial tract. For years they offered premiums for an *Essay* on the improvement of DARTMOOR, but did not succeed in obtaining any; and when afterwards I gave them my sentiments on the subject, they honoured me with a valuable medal, and immediately proposed a premium for the cultivation of florin ON DARTMOOR.

Most flattering and lucrative offers were made to myself from high authority, through a most respectable Vice-President of the Bath Society, to induce me to engage in this Herculean labour; but my late period of life deterred me from accepting the tempting offer.

Where could we find a finer field for the employment of the *industrious* and *unoccupied*? Am I not justified for stepping out myself, and for calling on the BATH SOCIETY as my *coadjutor*? Strange as my former measures may have seemed, that respectable Society gave me their most decided support; and their premiums have produced meadows, though not equal either to *my* expectations or pro-

mises, yet exceeding the hay crops ever raised in ENGLAND.

Their late Transactions show, that of themselves they took a most judicious step ; and by proposing a premium for the cultivation of *their own* agrostides, brought a most important point to issue ; and having luckily fallen into the hands of an acute and patient gentleman, the Rev. W. B. BARTER, have ascertained, as I shall prove from Mr. Barter's facts, that the *English agrostides* are inferior to the *Irish*, both in the quantity and sweetness of their hay ; and yet exceed, in quantity at least of their crops, those of any other grasses they mow in England.

The Bath Society, having kept pace with me so long, will not I hope decline to follow me one step farther ; and having tried what their own *agrostides* can do under cultivation, when *planted out*, will permit me to try through them, if I can call their *spontaneous agrostides* into luxuriance as I can do our own. We have now a new motive common to us both, for the Bath Society seems as anxious to find employment for the industrious and unoccupied, as the Board of Agriculture, or myself : let us then make our joint effort on the *alpine wastes of Dartmoor*. My hopes of success are sanguine ; and should we fail, we have the comfort of knowing that no other has as yet succeeded.

My measures are already fully detailed ; the local application of them alone remains. Let the Bath Society persuade the proprietors of the ground I shall describe, to permit *them* to improve at the utmost *two* acres for experiment at their own expense, the produce belonging still to the proprietor ; who must be interested as owner of the contiguous ground, whose improvement depends on the success of the experiment.

One acre of *grassy sole*, and one acre of *heath*, the former not too shallow, and the peat of the latter not

fibrous or spongy;—the *inclosure*, *drainage*, and *top-dressing* of these will cost the Society very little. Weeding I have no doubt I shall scarcely trouble. I have often complained when I have not severities to assist me in this operation ; but I am well assured I shall not be stinted on DARTMOOR, as Nature has bestowed them in greater profusion on this mountain tract, than it seems entitled to, either from *latitude* or *elevation*.

Both BESSY BELL and KNOCKLAID are higher mountains than DARTMOOR ; yet I saw our spontaneous *stolonifera* in good health on the summit of each ; and the strong *stolo* my friend MR. DICKENSON inclosed to me, which he had himself found growing near the prison on Dartmoor, was not like the *agrostides* of LOWER DEVON, the *vulgaris*, but the true *stolonifera*.

CHAP. VII.

PEAT BOG.

1st, WITH A VIEW TO THE IMPROVEMENT OF ITS SURFACE.

THE immeasurable peat bogs that cover so much of our surface in the British Isles, have been long considered as a most extensive field, requiring only the exertions of man to bring them within the agriculturist's pale, and to make them, like the rest of our surface, produce food for himself and his cattle.

I am confident this immense area has not escaped the attention of the Board of Agriculture, and that the reclaiming *some* of these desolate tracts has been speculated on by them among the means of employing the *industrious* and *unoccupied*; and I fear that where the nation itself, with its purse open, has totally failed, the Board of Agriculture will not be successful to a great extent.

It is now eight years since Parliament directed their attention to the improvement of the bogs in one part of the United Kingdom, and, pointing out the measures by which it was thought this great object was likely to be forwarded, most liberally voted £5000. to be applied to the purpose. They afterwards voted £5000. more; and, in full confidence that their money would be honestly applied to the great

national object for which it was voted, gave another grant of a much larger sum, and added £12,000. to the former £10,000.

Were not the expenditure of this whole sum, with that of a debt incurred, minutely detailed to the Parliament itself, and by them to the public; I should be afraid to assert, THAT not one shilling of the £22,000. was laid out on *any* of the operations held out to be necessary for the improvement of these bogs; but that the *whole* sum was distributed among individuals, under the names (assumed as a qualification) of ENGINEERS and SURVEYORS, while a spade was never put into the ground.

Though not the slightest attempt was made to carry the object of Parliament into effect *practically*, it might be expected *information* on the subject at least would have been obtained from national liberality; and though actual practice might have cut too deep into a fund from the beginning destined to other purposes, yet that public expectation might have been gratified by a few experiments, holding out encouragement to future exertions, and pointing out by their success, the measures to be adopted by those who should make new efforts to reclaim this unsubdued domain of Nature.

Nothing similar occurs; I cannot find that a single *acre*, or even *perch* of bog was reclaimed out of the grant. The unbroken sum was appropriated to the sole purpose of PATRONAGE; and the reports made to Parliament give the lists of the individuals among whom it was distributed, with the fortunes made by each separately, from their share of national liberality.

I have more than once entered into the obscure question of the original formation of the unwieldy masses of combustible substance, that load and render barren so much of our surface. Their improvement too has been a favourite

subject with me, and not now encountered by me for the first time ; yet, Herculean as the labour may be that is required for reclaiming such formidable morasses, I fear it is not so manageable as to serve the purpose of the Board of Agriculture, by affording prompt employment for the *industrious and unoccupied*.

My speculations on the subject shall be limited to two fields of action ;—the immediate surface of these bogs as they now stand, and the lower surface that remains after the unwieldy mass of peaty matter is carried away.

The soil of these great bogs, like all the surfaces we have hitherto encountered, is loaded with undischarged water, which must be let off with much caution ; for drought is an enemy equally formidable and, I fear, not to be subdued, where the *fibrous light spongy* peat reaches to the depth of a very few feet ; nor would I be tempted to the encounter of such a bog.

Where we find the sponge of the upper surface very shallow, and the fibre of the peat in an advanced stage of decomposition, we may hope to give it such consolidation as will fit it for agricultural purposes ; for the danger of our drought is not here so great ; and this can only be done by *carrying in* great quantities of earthy or clayey material from the exterior, to be well mixed up, and blended with the actual surface peat.

The late Bog Commissioners, in their instructions, refer much to the *subsoil* for these consolidating materials, and talk warmly of lime-stone gravel, which they seem to expect to find beneath the peaty moss.

I never was fortunate in my searches for a valuable substratum, though I know it sometimes exists, but always inaccessible ; for so soon as we open a pit, it soon fills with water, and from that time we are disabled from availing ourselves of the lower material, however valuable for

agricultural purposes ; and when this material is to be carried to any, even small distance, the portage over deep wet bog becomes intolerably expensive. Hence it soon appears, that *contiguity* of the consolidating material is of more importance than its *quality*.

The formidable extent of most of these bogs, and the load of water they are always incumbered with, and which previous to operations for reclaiming them must be discharged, has given rise to an opinion, that the work is too great to be encountered by individuals,—that the force of the *nation*, or at least of the *great proprietor*, must be called into action, to execute these general operations, before the field will be ready for the diminutive exertions of the individuals who are to encounter their smaller portions.

This opinion is founded in error; I have shown more at large, that the work cannot be facilitated by any previous operations ; that there is but one description of persons, by whom the business of reclaiming our bogs, great or small, can be undertaken, that is, the actual holder of the contiguous farm, I mean the land *continuous* with the bog.

This personage must level and scarify the surface of the bog he advances into with small drains ; and he must carry into it the consolidating material from the nearest place he can find it in. Can the *industrious* and *unoccupied* poor be called in to assist in these diminutive operations, their employment will be abundant ; for small as each portion may be *in itself*, the number of the whole is infinite.

This I am confident is the only mode in which the reclaiming our great bogs can be encountered with any prospect of advancing upon them with success. Shall PARLIAMENT or the *great proprietors* contrive to aid the adjoining landholders, by assisting them in paying for the

labour of the *industrious* and *unoccupied*, two important points will be carried;—improvement will advance, and employment will be found for the distressed labourers.

But who can expect that the Parliament, after having been already so gulled, will again embark in this adventure? The great proprietor is differently circumstanced; it is upon his *own estate* the improvement is to be carried on, and the ground reclaimed must in some years revert to himself. Besides, the persons who will earn the money he is laying out, are probably (and he may make it a condition) his own starving tenants, or under-tenants. His own situation, or that of his agent, must enable him to see that he is not imposed on. Let him give, *at his own suit*, a small number of the *distressed* and *unoccupied* labourers to as many industrious tenants, holding the edge of his bog, as he finds willing to engage in the work with spirit: let him stipulate the assistance *the tenant himself* is to give in carrying on *his own work* for his own sole benefit during his lease; and let the landlord rigidly hold *in his own hand*, the payment of these additional forces he has raised for the melioration of his own estate, and for the laudable purposes held out by the Board of Agriculture.

There is an extensive description of peaty surface spread over much of England as well as the other parts of the United Kingdom, which I am sanguine enough to hope would admit a considerable degree of improvement at an expense within bounds; and at the same time would afford employment to the *industrious* and *unoccupied*.

I mean *peat moss* thinly covering a barren vapid sand, and generally clothed with a poor stunted heath. I know not a description of ground more decidedly unproductive, and which seems improvable for agricultural purposes only by the importation of a firmer material, and its mixture with stimulating manure.

I wish much to see the spontaneous powers of Nature tried also on this wretched surface; the expense would be less than in any of the former cases, as we are relieved from drainage. Can ashes be procured by the combustion of some of the peat, with a portion of the substratum or contiguous clay, the surface could be enriched on very moderate terms. Coal is cheap in many parts of England, and kilns for the combustion of any earthy material may be lighted at very little expense, and thus ashes procured in sufficient quantities.

Were the surface levelled, peat and sand mixed, we know the *heath* would not resume possession, and I am certain with moderate encouragement the *gramina* would; for I have often observed, where the surface of a vapid red sand has been laid bare, that some scattered solitary *agrostides* have appeared.

It is very many years since I saw BAGSHOT HEATH; and from my faint recollection, it was exactly of this description. Now we know that the *stolones* sold by London seedsmen for florin were gathered on Bagshot Heath;—the question is not, were these the true *stolonifera*? The fact is certain, that spontaneous *agrostides* are abundant there; and since they come forward without encouragement, no doubt when the surface was prepared to invite them, they would spring up in greater abundance, and would soon be accompanied by other diminutive grasses, together forming a green sole, and affording some pasture.

The experiment at least might be tried on a small scale, and some employment thus afforded to the poor; and so far as experiment, a very small quantity of lime might be tried.

CHAP. VIII.

PEAT BOG.

WITH A VIEW TO THE IMPROVEMENT OF ITS
UNDER-SURFACE.

BY the under surface, (perhaps the phrase may be improper) I mean the new surface laid bare when the unwieldy mass of peat that touched it, and impeded its improvement, is carried off.

This is an Herculean labour, too weighty to be repaid by the acquisition of the ground hitherto useless, but now applicable to agricultural purposes. Some very favourable circumstances must occur, to enable the proprietor to disencumber himself of this Homeric

—ἐλωσιον αχθος ἀρούρης—

this cumbrous mass of earth, before he can avail himself of the new field that has not yet been exposed to the view of man.

In SCOTLAND, ingenuity has devised means of making the under-surface accessible. MR. DRUMMOND HOME has contrived means of conveying his useless masses of peat into the river FORTH, which carries them off, leaving himself a valuable soil, inaccessible to him before, but of

which he is now availing himself with much spirit, and to a considerable extent.

OUR great consumption of peat as fuel, assists us powerfully in getting rid of the load of uncultivable material that so often encumbers us. My friend JAMES SCOTT, Esq., following the practice of his father, has supplied the CITY OF DERRY with turf for very many years; and has carried off the peaty mass, some feet deep, from a large area, now by his exertions bearing valuable crops.

These, at least so far as considerable extent goes, are I fear solitary instances. Many circumstances must concur to make this *under surface* fit for agricultural purposes. MR. SCOTT luckily has a good clay; so I find has MR. DRUMMOND HOME; but the under soil is seldom encouraging. When my chemical friends tried the material of the *substratum* I sent them, (and it was a most common one, a *whitish ponderous viscid clay*,) they found, on analysing it, *eighty-three* parts silex, *sixteen* aluminē, and *one* oxide of iron;—a soil little favourable to the production of *grain crops*: besides, it is generally low; and complete discharge of the water, attended with much difficulty, is indispensably necessary. We must then, in ninety-nine places out of a hundred, where the upper peat is cut away, look for other crops than the *farinaceous*, and a style of culture adapted to the harsh, and more generally the peaty soil we have still to work upon.

The improvement of CUT-OUT MOSS has long occupied my attention: it was the first agricultural topic I ventured to bring before the public, and I now resume the subject with peculiar pleasure; for I consider this species of improvement, as the most copious source extant for the employment of the *industrious* and *unoccupied*; and *that*

upon which their labour may be constantly put in action in innumerable places at once, and with a certainty that the most valuable results will follow, and with a rapidity unequalled in any other style of improvement; and also that the value created by it will bear a far greater proportion to the expense incurred, than could be procured by any other exertions of pure manual labour.

I have also to add in favour of the measures I wish to see carried into effect, that they are not *theoretical speculations*, founded on *general principles and high probabilities*, like some of the preceding: for before I ventured to propose them to the world, experiments were carefully and patiently made, success ascertained; and now, after the lapse of several years, the meadows formed on cut-out moss of the very worst description, and utterly unfit for any other culture, continue to produce crops, not to be approached in quantity or quality by the meadows formed in the old way, and loaded with the best dung to any amount.

It is eight or nine years since I published a pamphlet, the most important topic in which was the *improvement of cut-out moss*. Now as the positions there laid down have never been controverted, and as the experience of so many years has given to myself the most complete confirmation of their truth, I shall state some few of them as laid down in that pamphlet, which was honoured with a medal.

Page 17.—Under the head of WET MORASS; comes a
 “ description of a ground well known to, and actually in the
 “ possession of most farmers and gentlemen in the North
 “ of Ireland, as well as in many other parts of the United
 “ Kingdom—I mean *cut-out moss*.

“ The facility with which the *very worst* and wettest of

“ these abandoned spots can be completely clothed with
 “ grass, is hardly credible ; the only difficulty to be encoun-
 “ tered is effectual protection from cattle.”

Page 18.—“ The immense extent to which this species
 “ of agricultural improvement may be carried, or rather
 “ would imperceptibly carry itself if attended to, is scarcely
 “ to be believed.

“ The process of cutting out moss is going on steadily
 “ in all peat countries ; but the conversion of the ground,
 “ after being cut out, into profitable land, is practised by
 “ few, and by those only under the most favourable circum-
 “ stances ; that is, when the ground is left sufficiently dry
 “ and solid to bear a crop of *potatoes*, to be followed by
 “ rye, perhaps meadow.

“ But where the ground is wet, low, and soft, it is gene-
 “ rally left to Nature to clothe such surfaces as she best
 “ can. It is even very seldom she is aided by any attempt
 “ to level or let off the water.”

Page 20.—“ Now if the small portion of moss annually
 “ cut out by such person or family be laid down with
 “ grass, so soon as the turf-cutting is finished, the business
 “ is done, and the meadow will follow close on the steps
 “ of the turf-cutter, as far into the main bog as his in-
 “ dustry shall have carried him.

“ I shall now indulge myself with a little *utopian* spe-
 “ culation on the subject, and shall suppose for a moment
 “ that the feasibility of the measure I recommend is ad-
 “ mitted, and the practice universally adopted ; let us try
 “ what will be the result in my own country.

“ To suppose that there are in the *Kingdom of Ireland*
 “ only 600,000 families using turf fuel, is a very moderate
 “ computation ; and I know that I shall be greatly within
 “ bounds, if we allow to each family, on an average, only

“ one perch *English measure* annually ; that is giving the
 “ family 160 years to cut an English acre of moss : thence
 “ it follows, if this improvement be carried into its ex-
 “ treme extent,—that is, if all the bog be reclaimed as soon
 “ as cut out,—we shall add annually to our profitable
 “ ground 3750 acres.”

Page 25.—“ I have thus opened to many in the NORTH
 “ OF ENGLAND, to more in SCOTLAND, and to immense
 “ numbers in MY OWN COUNTRY, a sort of domestic spe-
 “ culation of extreme lightness, when considered by
 “ them as individuals, but of immense consequence when
 “ we view the probable result of their united efforts.
 “ I invite in some sort the *mass of the people* to co-operate
 “ in the improvement of their country, rather by imper-
 “ ceptible attention, than by laborious or expensive exer-
 “ tions ; and I stake my credit on the success.”

It may be thought extraordinary that I should make so long a quotation from a paper already before the Public ; but it must be remembered, that the objects in view, when those two papers were written, were totally different :—that the former, a new style of improvement laid before a respectable BOARD, the proper tribunal to pronounce upon the merit of all such Plans tendered to them.

This second paper is laid before the Board of Agriculture on their *own invitation* ; its immediate object, explicitly pointed out by themselves, *to find means of employment for the industrious and unoccupied poor*. The Board of Agriculture will not be displeased to find, that the two objects coincide, and that when I find copious employment for the persons they point out, their labours shall contribute most powerfully to the improvement of the country :

“ Alterius sic
 “ Altera poscit opem res et conjurat amice.”

The celerity with which the measures I recommend are to become productive, is a point of much consequence; and I can establish it by a strong fact.

In spring 1811, the Farming Society of Ireland proposed a medal of five guineas value for the best Essay on *fiorin grass*. I gave in one; and, to prove quickness of return, promised, when I cut my turf in April, I would lay down a part of the ground from which the turf had been cut, and engaged to mow from it that *same season* a crop of hay of superior quality, and double the quantity, of any cut that year from an equal area.

I called upon my most respectable neighbours, particularly the Hon. and Rev. *Charles Knox*, to inspect the ground *before* the turf was cut, and afterwards when the crop was growing; and they reported, that I had completely fulfilled my promise. The same ground was inspected in *October*, by Committees of the Agricultural Societies of the STEWARTRY of KIRCUDBRIGHT and County of WIGTOWN, who saw with astonishment the meadows cut, and made a most favourable report.

About the same time, a Gentleman was sent over from DUMFRIESSHIRE to inspect these meadows, and his first question was—Where is your meadow on cut-out moss? I took him there, and showed him the luxuriant meadow, pursuing the turf-cutter. He examined it with the greatest attention, ascertained the bounds of the narrow stripes made after each year's cutting, and then said: "*If I see nothing else, I am amply repaid for the trouble and expense of my journey.*" This Gentleman, on his return home, published his report of what he saw.

The late RIGHT HON. ISAAC CORRY also inspected these meadows, and published his report in a letter to

the present Lord Colchester, an amateur. I shall quote his own words.

“ I now inquired for my friend’s experiments on bog, particularly on *cut-out moss*; being well aware of the great benefit that might be derived from that description of ground being made productive.

“ He took me to the place where he had cut turf last year, laying it down in September 1808. The crop here seemed equal to any I had examined, and was in beautiful verdure. As I considered this description of ground as my principal object of inquiry, I was very particular, and made the mower cut in different places. “ I found the sward enormous.”

I shall produce but one witness more to establish my successful practice of converting *cut-out moss* into most valuable meadows; a name which I know will be respected by every English agriculturist.

MR. CURWEN was so good as to visit me, and inspected my crops of every description with much attention, and published his report upon them on his return. When he comes to the conversion of cut-out moss into meadow, he says :

“ The view of this could not fail of moving the most phlegmatic. My friend’s persevering labours have demonstrated the practicability of converting millions of acres in the United Empire, which are now unproductive :—what a benefit, to draw from a lifeless mass an equivalent of victual, to the major part of what is under tillage ! Permit me to say, in a country that has so much worthy of admiration, no sight has afforded me more gratification than such a produce on a lifeless bog. What a source of riches is here !”

The calculation I have made above, of the quantity of

peat moss cut out annually in *Ireland* alone, increased by what has been cut out in *England* and *Scotland*, and multiplied by the number of years in which the quantity of *cut-out moss* has been accumulating, will show that MR. CURWEN'S *phrase of millions of acres* will not be considered merely as an hyperbolical mode of expression. But the materials from which MR. CURWEN and I pronounce upon the magnitude of this unhappy description of ground, are very different. I *speculate à priori*, calculating from *stated data*; while my friend, well acquainted with each of the three kingdoms, speaks from his own observation, and pronounces, vaguely indeed, from what he had *actually seen*.

The meadows in *England* and *Wales* are estimated at six millions of acres; and Mr. Curwen himself, several years ago, estimated their average crops at a ton and half to the English acre. Shall we be content with such scanty produce from the meadows formed in our way on *cut-out moss*?—By no means. Mine have never fallen short of *treble* that amount.

Whatever additions then shall be made to the meadows of the United Empire in this way, a still greater diminution must take place in the area now under meadow; and much of this must be added to our present agricultural field, to the great increase of our stock of grain crops, and to the increase of the agricultural population, already (in *England*, at least) bearing too small a proportion to the manufacturing population.

I hope I have said enough to convince the Board of Agriculture of the extreme importance it would be to the whole Empire, to have the *cut-out moss*, scattered over so much of its surface, brought into a productive state; and I hope the high authorities I have quoted, will also convince

them that the mode I have *practised* would effectually answer the purpose, if extensively adopted and with spirit.

When I first published my sentiments on this subject *my own* conviction was complete; and it was not my fault that the important topic was not further pressed on the Public, for the attempt was made and stopped in its progress.

I occasionally brought forward the subject in the circulating agricultural publications; but finding it not taken up, I began to consider who were the persons to begin, that I might endeavour to rouse them into action. The proprietors of the estates studded with these disgraceful tracts and patches, instantly occurred to me: these were the persons interested, as the reversion when leases expired was theirs. They possessed the means of assisting, and had power to *enforce*; but the landlords through the United Empire were so unconnected a body, that I knew not how to apply to them with any prospect of attaining attention. I found I must address myself to a particular proprietor, and, could I find great extent of territory accompanied with public spirit and liberality in the proprietor, I might possibly rouse exertion sufficient to set an example that would be followed.

In my own country I could not hesitate. The CORPORATIONS OF THE CITY OF LONDON, I have no doubt, are the greatest landed proprietors in IRELAND, possessing nearly the whole of the COUNTY OF DERRY. Other circumstances determined my selection. The public spirit and *liberality* of the Corporations were to the Gentlemen (of that country) matter of great notoriety; always ready to afford ample assistance on every public occasion, and only requiring to be called upon. I know their character was well drawn by the poet:

Dii tibi divitias dederunt, artemque fruendi.

To these respectable Corporations I addressed a memoir, premising, that though well acquainted with their liberality, I did not call for their money. I went into the subject of *cut-out moss*; stating, I presume, the facts I have mentioned here; and showing, from the local circumstances of great population, and a most frequent dispersion of *peat bog* over the whole surface of the County of Derry, that it was more disfigured by unreclaimed *cut-out moss*, than any other county, and might be considered as well described by TACITUS—

Terra in universum paludibus fœda.

Relying on the influence these respectable Corporations possessed, and secure of the attachment of their tenants, and of the prompt obedience that would be paid to every thing recommended by them, I pointed out the directions they should give their tenants when cutting their turf; a compliance with which would effectually prevent the further increase of these odious morasses.

In case I should be mistaken in the disposition I had assumed to exist, I showed how, by the mildest measures, their tenants might be *compelled* to consult *their own* interests, and to improve without expense and to the greatest advantage *their own properties* during their leases, with other matters which I conceived interesting to the County of Derry and its great proprietors.

This memoir, together with a letter I addressed to himself, were given to MR. SLADE their Secretary, by the LORD BISHOP of DERRY: but neither were favoured with any notice on the part of *Mr. Slade*, or the LONDON SOCIETY, to whom it was addressed.

In the course of a long life, I had some experience of

the hauteur, and rudeness of office ; and seeing I was not likely to obtain attention, after waiting a long time, I requested my friend Sir George Hill to call on Mr. Slade for my memoir, that I might bring my sentiments on the improvement of my country before the Public through some other channel, that which I had chosen as a desirable one being shut up by the Secretary of the Society. Sir George's application failed. I then spoke to Mr. Slade *personally*, requesting my manuscript might be returned to me, as I had not a copy. Mr. Slade promised it should, but I heard no more of it.

Though my whole manuscript seems irrecoverable, I found one sheet among my loose papers, where it had lain three or four years. I shall quote it as it stood :

“ The question then I have taken the liberty to bring before your respectable Corporations is—Are these 3750 acres, as formerly, to be added to our national field of barrenness and deformity ? or are they, by exertion and attention, without expense, to be thrown into a style of great beauty and high profit, adding every year to our most valuable lands, and fully equal to any of them ? ”

I then detail the measures to be recommended to, and enforced upon the *turf-cutters*, in their annual proceedings ; by which the portions contained in the COUNTY OF DERRY, of the 3750 acres cut out ANNUALLY in all Ireland, will be reclaimed, and made profitable in regular course.

I next call the attention of the London Corporations to the wide field of desolation, the result of indolence and neglect accumulated for centuries ; and I encourage them to encounter it. I tell them, “ There is a mighty agent, whom it has been the fashion to threaten to rouse into action upon any emergency, THE MASS OF THE PEOPLE.

“ Buonaparte talked of the thirty or forty millions,

“ who would rise *en masse*, and overwhelm an invading enemy. PARTY, too, can make the same threat, and tell us of the millions that are ready to rise in support of their demands.”

“ Let us avail ourselves of the same instrument, and rouse the population of the County of Derry, to the encounter of these scenes of desolation.” I then proceed to show with what facility these respected landlords could carry this important point, and rouse the population of the county, to sweep these disgraceful morasses from the face of their county, in a few weeks;—and now, after four years, in the hour of distress, I call upon the same landlords to employ *the industrious and unoccupied* part of the same population on the same work.

The task I shall put upon them, *provided I can get access to them, the usual channel being obstructed*, will be very light. Several of their great leases having made a near approach to their termination, and one of the largest, THE DRAPERS', having fallen, and in their own actual possession, their attention is brought more immediately to the spot; and the offensive morasses I complain of, cannot escape their observation in the midst of a fine country.

At this moment the Board of Agriculture speculate upon raising an army, to invade the unimproved parts of the empire—and where can we put them on actual service so effectually, as on the estate of the Drapers' proportion, now in their own hands?

Let me not be charged with partiality to my own country for endeavouring to concentrate general efforts, and bringing them to bear upon one favourite spot. The measures I shall recommend are equally applicable to *all countries*; and when I address myself to the Corporation

of Drapers, I tell every landlord in the empire possessing peat bog,

————— *Mutato nomine, de te*
Fabula narrator—————

I now proceed to measures of practice applicable to all *peat countries*.

Let the Drapers' Corporation employ five parties of twelve each, composed of their industrious and unoccupied poor tenants, with an overseer to each of them; let these five corps, under proper general directions, move about their estate encountering *cut-out moss wherever* they meet it, and converting it into valuable meadows by the following simple process.

First, light a few fires to form ashes for compost; then level the surface, and make frequent drains, so as effectually to discharge all stagnant water, and then draw a strong fence round the whole area;—the great work is now over, and on this occasion I shall not, as on others, wait until Nature sows or plants for me. I desire the prepared surface be sprinkled over with a little compost, and then strings or stolones of the *agrostis stolonifera* (IRISH FIORIN) to be spread on the surface, and the remainder of the compost thrown over them.

This compost is to be formed of the peat or earth thrown out from the drains, and fence; and the ashes to be mixed with it, will be ready in due time; while the stolones with which it is to be laid down, are gathered in abundance on the spot, in the bog itself.

I have now five corps prowling about the Drapers' estate, seeking what morasses they shall devour; and I answer for it, the odious description vanishes in ONE MONTH from the face of their territory—let us see at what expense.

Twelve men at 1s. per day, and an overseer at 2s. 6d., amount to 4l. 5s. per week; 17l. 0s. per month: so that the whole five parties, employed for one month, will cost the *Drapers' Corporation* less than 100l., and make the entire of their newly resumed estate presentable.

But this hundred pounds I will not take off the Corporation's hands *in money*; they must in some sort *act personally*, and adopt the arrangement I have laid down. I am ready to *communicate* or confer with their agent on the general management of these measures; and a distance of 17 or 18 miles need not prevent all, or any of the overseers coming to receive instructions *from me*, and encouragement from the inspection of my long-reclaimed CUT-OUT MOSS, and a lesson on the mode of proceeding, where the process is still continued regularly every year.

I cannot let off the London Corporations for the exertions of the Drapers' alone, however strenuous. There are eleven companies more, exclusive of the London Society, all possessing extensive estates in the County of Derry, and all disfigured by the morasses I have described.

I consider myself as in the employment of the Board of Agriculture, raising corps from the mass of the industrious and unoccupied, for their service; and I do not think I am unreasonable in asking *one corps* from each of the 12 estates, to be employed like the Drapers' 5, in waging a war of extermination on their odious morasses: the result, I answer for it, will be, that their *Lessees* raise similar corps, and carry on the same unremitting hostility, in conjunction with their principals: 20l. each is all I ask; but, as before, I will not have their money. I insist on their own exertions; and if I be gratified with the sum and the mode, I pledge myself to the CITY OF LONDON, that with their 324l. they will materially change the face of

the country they are interested in; while Parliament, with their twenty-two thousand pounds *laid down*, could not *reach a single acre*.

The London citizens cannot be very general agriculturists; but as many have villas, and grow their own hay, and all of them see the SURREY and MIDDLESEX crops; I am glad to seize the opportunity of showing them what this *cut-out moss* on their *own estate* may be made to produce in a style of crop with which they are acquainted.

MR. WATT, a Derry merchant, holds some lands under the London Society, from which he has cut a deep covering of moss:—meeting some Essays on reclaiming Bog, Mr. Watt encountered his own in the same way, with much spirit.

Coming not long afterwards to Derry, and hearing of his proceedings, I waited on him, and went to see his ground; which I found highly elevated, and so coarse, that I am certain the culture of *farinaceous* crops could not have been pursued upon it with success.

THE FARMING SOCIETY OF IRELAND proposed a premium for the two best acres of Fiorin raised in the year 1816; and when the amount was rigidly inquired into, and established upon oath, Mr. WATT'S was found the best; and he obtained the first premium, 50*l.* while the second 30*l.* was adjudged to another.

The records of the Farming Society, and the English Farmers Journal for May 26, 1817, state the amount of the two crops, 2 acres each; they were weighed on the following March, to secure the hay being quite dry at the time: the one amounted to 5 tons 19 cwt. and 17 pounds, to the English acre; while MR. WATT'S reached 6 tons 16 cwt. 3 quarters and 14 pounds.

The London Corporations holding estates in the County

of Derry, would do well to inquire if the SURREY and MIDDLESEX hay crops, stimulated by so much London dung, amount to ONE-THIRD of what can be raised on their own estate on the very description of ground to which I am labouring to bring their attention, *cut-out moss*, and upon which I am anxious to see their own *industrious and unoccupied tenants employed*.

MEMOIR
ON THE
CULTIVATION
OF
FIORIN GRASS.

DRAWN UP BY DESIRE, AND FOR THE INFORMATION

OF
HIS IMPERIAL HIGHNESS
THE
ARCHDUKE JOHN OF AUSTRIA.

1818.

P R E F A C E.

THOUGH I have already appeared so often before the Public on the subject of Fiorin Grass, I cannot decline complying with the wish of the ARCHDUKE JOHN OF AUSTRIA, signified to me by SIR THOMAS ACKLAND; who tells me his Imperial Highness is very desirous to obtain fiorin roots and stolones from IRELAND, and particularly *from me*, with information and instructions on the subject of this newly noticed grass.

That his Highness was now cultivating fiorin from stolones he had obtained from DENMARK, and was desirous to compare the *Danish fiorin* with that of the country where the plant was indigenous, and first brought within the pale of cultivation.

I feel myself highly honoured by the expression of the Archduke's wish; and in com-

pliance with it, have thrown together, for his Highness's information, every thing relative to this grass that I conceive to be sufficient to make him acquainted with the natural history and habits of fiorin, and the proper mode of cultivating it, so as to raise from it such immense crops of hay as we are used to see it produce in this country.

I return my most sincere thanks to my DANISH PUPILS for introducing my favourite to an amateur of such exalted rank ; I well know the success with which they have cultivated fiorin in their own country, and the pains they have taken to make their neighbours of SWEDEN and NORWAY partakers of the advantages they themselves are deriving from this grass, and for which they express so much gratitude.

I am proud to find my *protégé* travelling southward, and may live to see the dominions of our Imperial Ally highly benefited by the introduction of this grass ; for when such eminent personages as their Highnesses the

Archdukes enter with zeal into agricultural pursuits, the improvement of their country is a necessary consequence.

Moy, Ireland, Jan. 22, 1818.

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writers of the 18th century reprobate it.—Facility of raising great fiorin crops without breaking the surface, sowing or planting.—Spontaneous luxuriance of fiorin more easily excited in our worst than in our best grounds.—Reasons, à priori, why it should be so.—Mountain tracts peculiarly adapted to the spontaneous production of great fiorin crops.—These paradoxes necessary consequences of the properties with which Nature has endowed fiorin grass.

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MEMOIR

ON THE

CULTIVATION OF FIORIN GRASS.

THOUGH I have already given many desultory publications to the world, on the subject of *fiorin grass*, and although the value of my discovery be now well established and admitted; I am induced, by the acquisition of a new pupil of exalted rank, HIS IMPERIAL HIGHNESS THE ARCHDUKE JOHN OF AUSTRIA, to resume my pen, and, for *his* information, to epitomise the most important of them, and to give an account of the mode in which I became acquainted with a vegetable, that, notwithstanding its power of supplying man with the most important article in rural œconomy, HAY of the best quality, and in treble the quantity yielded by any other grass, had for many ages escaped the attention of agriculturists.

Previous to the request from this eminent personage, (communicated to me by SIR THOMAS ACKLAND) to transmit to him Fiorin *seed*, *roots*, and *stolones*, with instructions how they were to be managed; I had of late thought it incumbent on me, before I give up this favourite subject, (which must be very soon) to detail the progress of my discoveries; for, in the course of the eleven years

during which I have been making experiments on, and cultivating Fiorin Grass, new properties and applications of this curious vegetable were perpetually occurring; and of these some of the latest will probably be found by far the most important.

At the same time I must confess, that some of the applications and practices, which were at first so promising as to induce me to recommend them to the world in the strongest manner, I have since been obliged to abandon; finding that in the practice of years, the plant abated gradually of the luxuriance it first exhibited under them, shewing, after some time, that they were not to be persisted in with prudence.

Of other applications of fiorin grass, upon which I was at first very sanguine, I begin to entertain doubts, which I think it incumbent on me fairly to state, leaving the questions open to future amateurs to investigate, using my own best endeavours to bring them to issue, if I can, in my own time; contenting myself, at present, with stating them openly, with my reasons for expecting favourable decisions, and also my reasons for doubting.

From these concessions it may be inferred, that I am relinquishing the high expectations I had entertained of the benefits to be derived from my discovery, lowering my tone, and receding from the lofty promises I had so often made to the world.

This may be partly true; but on the other hand I boldly say, that my conviction of the value of this grass has never been on the wane, and that from MAY 1806, when I first began to make observations upon it, until this moment, my expectations of the benefits to be derived from the discovery of fiorin, have been increasing, and my hopes at the end of every successive year more sanguine;—for, though I was obliged to give up some uses and applica-

tions, that I had previously recommended, others were perpetually occurring, that more than compensated for them ; these variations being the consequence of the diversified, and I may almost say, contradictory habits of this strange vegetable.

The grand, and I am willing to concede the *sole*, use of fiorin is, to furnish *dry* hay to our winter cattle ; and that it will do this in far greater quantities, and of superior quality, from our *best* grounds, than they yield at present, are positions I have never in the slightest degree receded from.

That its crops can be raised and kept up in continued luxuriance, on the same good grounds, on cheaper terms, and with greater certainty, than those of any other grass, I persist in asserting, having my *tenth* and *eleventh* successive crops *now* making up, without a trace of diminution in their value.

Important as these advantages may be, when an article of prime necessity is the object, yet they must appear insignificant when compared to what follows ;—for it will be seen, that crops similar to those thus obtained from our *best* grounds, may also be raised from those we may call our *worst* : such at least as never before were supposed capable of bearing crops, either of hay or corn.

Shall I be told, that the ingenuity and industry of man, supported by capital, may, at great expense, force cultivation beyond the bounds it was supposed capable of reaching ? I reply, that in passing those bounds, I shall incur scarcely any expense ; for, that when obliged to *cultivate*, the process shall be light and simple, and the cost far less than what is now incurred in preparing our very best ground for only similar crops : but that in the more general, and more extensive description of this new territory, upon which I propose to advance, I shall use no culture,

I shall only rely upon NATURE, with the slightest encouragement, for throwing up, *of herself*, the very fiorin crops I am so anxious to have produced, and for continuing them in steady luxuriance, at one third of the expence now required to keep up the crops that grow on our best grounds.

I have thus, in addition to my desire of gratifying my Imperial Pupil, two motives for *now* coming forward, and probably for the last time, on the fiorin subject; the one, to prevent some of my early positions from leading any one into error, either by encouraging the continuance of some practices, which I have found it prudent to abandon;—or by enabling the enemies of fiorin (and they are many) to depreciate its value, by pointing out instances, where I myself have found it necessary to give up its culture, even under the very circumstances where I had once most strongly recommended it.

My second motive is, to avail myself of the opportunity the late flattering application has afforded me, of bringing forward an agricultural subject, and of recommending measures, which I consider as of vital importance to the nation, in the administration of a VICEROY of known attachment to the agricultural interests of his own country, and who, I have no doubt, will warmly patronize and foster those of the kingdom over which he now presides: and perhaps the more readily, when he finds the style of improvement which I hope to see further advanced in my own country, has already completely succeeded in DENMARK; and that its success *there*, has reached the ears of some of the most eminent personages, and most zealous agricultural amateurs on the Continent; and has inspired them with a wish to see the dominions of their Imperial brother partake of the benefits so gratefully acknowledged by their *Danish* neighbours.

Other governors, had I called on them, might have been

liberal, and possibly might have thought *public money* well disposed of, in promoting the improvement of IRELAND ; and of course would have granted abundance.—I call upon EARL TALBOT with different hopes and expectations ;—money I scarcely want, a perfect pittance will answer all my purposes : but should I be so fortunate, through my compliance with the Arch-Duke's request, as to attract EARL TALBOT'S notice, and to enlist his EXCELLENCY in a new agricultural pursuit, I shall draw heavily on his countenance,—his encouragement,—and even on his attention.

Nor am I without hopes of contributing to his amusement ; for the grounds upon which I propose to make the experiments, by the success of which I expect to encourage *practice* on a larger scale, shall be all within the reach of his morning ride, so that his Excellency himself will not only be enabled to form his judgment of my measures with his own eyes, but also to take a distant view of some of the extensive fields, whose present wildness does not discourage me from expecting to see them soon clothed with valuable crops of hay.

From the sites which I hope to be allowed to choose as the scenes of my experiments, his Excellency can look down upon the wide field of highly-cultivated grounds, (mostly meadow) beneath him, and on his Southern side he will see the embrowned and desolate tracts, to which I mean to transfer the meadows that in future shall supply his capital with hay. He will probably be disposed to smile at my *Utopian* speculations : but when he looks to the incalculable benefits that would be derived to the nation he governs, from their success ; and when he is told of the places, where similar measures have succeeded in similar situations ; and above all, when he shall be shown the vegetable I propose to *cultivate*, growing *spontaneously*

and in *luxuriance*, on the spot, in the very soils, and at the elevations, where I mean to give it the exclusive possession, he will, I hope, repress the smile, and suspend his opinion, awaiting for the result, which will enable him to decide upon the feasibility of my schemes, and also to pronounce whether the measures by which success has been obtained under his eye, be so light in expense, as to admit of being readily and generally adopted. The sites I allude to, and the measures to be pursued, shall be pointed out minutely, and in detail, when I shall have reason to expect that experiments will be tried on them.

I hope my zeal for the interests of my own country, and my wish to see its improvement commenced on the field where I am most secure of success, and where the produce I can raise is most wanted, will plead my excuse for this digression.

I shall now, for the information of his Imperial Highness, proceed to give some account of the original discovery of the value of this so long neglected grass,—of the order in which its several strange qualities burst upon me in succession,—my reasons for giving up some uses of it, from which I once had formed high expectations;—with the increased estimation in which I hold others, having *ten* years' experience of the durability of this grass, and the pertinacity with which it continues its luxuriance under proper management;—and finally, the facility of its *culture* and *propagation* in our wildest regions, where every attempt to cultivate any other vegetable would be quite vain.

My discovery of the great value, and strange properties of fiorin grass, was not *accidental*; the value and properties of the several varieties of the grassy tribe, were the objects I was in pursuit of; and my discovery of those of the *AGROSTIS STOLONIFERA*, (*Irish fiorin*) was the

result of experiments on this grass, instituted before I could form a conjecture what the results would be.

In my early agricultural pursuits, I soon discovered that the *gramina* was a subject, on which the practical farmer, and his instructors the modern agricultural writers, all *seedsmen, nurserymen, and agricultural book-makers*, mostly from GRUB-STREET, were equally ignorant.

This ignorance of the natural history of the *gramina* has been often noticed. MR. WHITE, in his Natural History of SELBORNE, says: "But of all sorts of vegetation the grasses seem to be the most neglected; neither the farmer nor the grazier seem to distinguish the *annual* from the *perennial*, the hardy from the tender, the succulent and the nutritious from the *dry* and *juiceless*." (Mr. White should have added *the buloniferous from the stoloniferous*.)

"The study of grasses would be of great consequence to a Northerly and grazing kingdom; the botanist who would improve the soil of the district where he lived, would be a useful member of society; to raise a thick turf on a naked soil would be worth volumes of systematic knowledge, and he would be the best commonwealth's man, who could occasion the growth of two blades of grass, where but one grew before."

Whether I be entitled to the credit which MR. WHITE so liberally bestows, those who have inspected the grass crops I have raised on *bleak mountains* and *cut-out moss*, can best determine; indeed MR. WHITE's praise, *a thick turf on a naked soil*, seems a prophetic description of many fiorin meadows.

I could quote other authorities also, for the small progress which this branch of agricultural knowledge has made; but I shall limit myself to one, whose weight will not be contested with me.

My friend SIR HUMPHREY DAVY tells the world, that of the two hundred and fifty-five varieties of grass, with which Nature has clothed our surface, man cultivates only *two*, RYE GRASS and COCK'S-FOOT: the former, though a kindly, is by no means a productive grass; and *cock's-foot*, far more valuable, was first recommended to the agricultural world by *myself*; for though many of the farming papers mentioned it, I was the first that recommended its cultivation in print; and the only one who, by numerous experiments, investigated its habits and properties, and then made the world acquainted with its value, with my reasons at length for holding it so high as I did.

Satisfied that information on the subject of the *gramina* was much wanted, I for some years paid great attention to this branch; and at length, at the solicitation of a noble friend, laid it off as a *distinct department* for myself, and immediately published what I called, *An Elementary Treatise on the indigenous Grasses of Ireland*, requesting assistance and co-operation—proceeding so far as my *then* knowledge of the subject enabled me, and pointing out the topics upon which further information was wanted.

I should not have mentioned this Essay, which I published early in 1806, were it not for a particular passage in it, which may now, when so much attention is brought on fiorin grass, be considered as a matter of curiosity.

I say in that Essay,

“ There is also a grass which grows in our low grounds, that I have heard some farmers talk of with much delight; they call it fiorin or fioreen grass: I have taken pains to procure some plants, but have not yet succeeded.”

Such is my first notice of this vegetable: *Quæ ab exiguis præfecta initiis, eo creverit, ut jam magnitudine laboret suâ.*

I soon obtained nine roots, with their withered *stolones* adhering ; I planted them in a plot, and, cutting off the long strings from the eight, supported those of the ninth in the centre with tall sticks.

When the vegetating season commenced (for it was March when I planted them), the eight that were cropped began to project their *stolones* horizontally, while the bunch, apparently of dry hay, extending upward from the ninth, began to produce green buds, which, soon acquiring length, hung down in festoons to the ground, where they rooted, extending themselves along the surface ; while the erect mass increased in bulk, exhibiting a singular contrast between the withered hay, and the green strings issuing from it.

In this state I left them in July ; and in my annual visit to the Northern coast, I commenced mowing my Portrush meadow, (August 1,) when I discovered that the sward was much composed of green stalks, without seed :—*culmi* without *panicles*, were quite new to me, this being the season in which most grasses produce their seed :—on attentive observation, I likewise found, that all these *culmi* came from fiorin roots, which also produced some stalks with seed.

My scientific friends, SIR HUMPHREY DAVY and MR. GREENOUGH, happened then to be on a visit to me. I brought them to the meadow, and showed them this extraordinary appearance, new also to them. Sir H. DAVY advised me to leave a small part uncut, and to watch what these stalks without panicles would come to : I did so, and observed them increasing in length, until unable to support their own weight, they fell down, still continuing to lengthen ; and that when I mowed the piece of reserved meadow, October 1st, its crop was double the amount of what was cut August 1st, and very fine.

This was my first discovery of the *stolones* of fiorin, and the first notice I had of a distinction made by Nature, between two tribes, or genera of her grasses, the *culmiferous*, and the *stoloniferous*; a distinction utterly unknown to the practical farmer, though there be many varieties of each description; and some of the latter, as well as the *agrostis stolonifera* (fiorin) of high promise, as showing great luxuriance, and containing much *saccharum*.

I was now most sanguine in the pursuit of this new grass, and on November 15, 1806, after potatoes, laid down a rood with it, in the following way;—I raised fiorin roots in abundance, from my plots which had luxuriated greatly in the summer. I planted them in drills eighteen inches asunder, trusting that the *stolones*, with whose properties I was now acquainted, would, in the summer, shoot across the intervals, and clothe the whole surface.

I was right; in May the stolones began to project across, and so effectually to cover the new ground, that the rows were soon no longer distinguishable; the thick fleece was uniform, and obviously a most valuable crop. I exulted in the easy method I had discovered of raising fine crops of hay, little suspecting it was the last I should lay down in that way; for that new facilities would be discovered, by which fiorin crops could be obtained at far less trouble and expense.

I was now most anxious to see what sort of *hay* fiorin grass would make; and the fleece on my rood was very great, which I had determined to mow early in October; but in 1807 the weather had been so bad, that all crops were then still in the field, and much alarm excited, lest it should not be possible to save them.

In this state of things, I had not authority over my own people, to induce them to give up matters of *prime necessity*, for the pursuit of what they called *new whims of mine*;

and I was thus obliged to defer mowing my florin rood until *December* 6; and on that day began, with little hopes of being able to save the hay.

The weather was not different from what is usual at that season; yet my hay was made up into trampcock, with as much facility as if it had been *July*, and was remarkably fine.

The vegetation of the withered *stolones*, which I had tied up round sticks the year before, concurring with other circumstances, made me suspect, that *dry* florin *stolones*, even after they had been long severed, were still animated; and I determined to try if my conjecture was well founded.

My neighbour and friend, GENERAL TROTTER, now commanding the Artillery in IRELAND, agreed to assist me: we divided what remained of the hay into two shares; one we put into the house, and of the other made a cock in the field; and every second Monday we took some *stolones* from *each*, and laid them on the surface of pots in my hot-house, scattering some compost over them: they always vegetated until the middle of April, when failures began to appear; these rapidly became more frequent, and before the end of MAY, the powers of vegetation seemed extinguished. The beginning of June was showery, and my little cock, which had braved the winter deluges, and the spring rains, now collapsed, grew fusty, and rotted, under a summer shower; like ÆNEAS, when his tender feelings were awakened:

*Quem primum non ulla injecta movebant
Tela, nec adverso glomerati ex agmine Graii
Nunc ventus territat omnis, sonus excitat omnis.*

The case was plain, for so long as life remained in the *stolones*, the vital spark counteracted the tendency to putrefaction; but when that was extinguished in the *stolones*,

the mass of them, having lost their protector, soon rotted ; —philosophers having discovered that the cohesion of the particles in *animate* and *inanimate* bodies depended on different principles ;—in the *former*, on the principle of life ; in the *latter*, on the chemical affinities :—hence all organized matter, *animal* or *vegetable*, so soon as deprived of life, having lost the *vinculum* by which they were held together, *dissolve*, that is, putrefy, and their component particles form new combinations according to their chemical affinities.

The facility of making up fiorin hay through the winter being established, and the principle upon which the success of this strange measure depended, being ascertained, I amused myself by exhibiting my powers, and made it a point to mow on the side of a great road for some years on the first Fridays in *December* and *January*, (being fair days,) to the astonishment of the numerous passengers : nor under these late operations did I ever see a handful of hay spoiled.

I now took great pains to ascertain the *amount*, and the *quality* of fiorin hay crops ;—that *my own*, for several years, amounted to from six to eight tons *dry* hay, has been proved upon oath repeatedly, before the noblemen and most respectable magistrates of my country. Last season the Earl of CHARLEMONT, with the Bishops of KILDARE and DOWN, were so good as to stand by to see some perches of my fiorin mowed, and weighed ; and to certify the amount of the damp green-sward to have run from thirty-two to thirty-five tons, to the English acre.

I consider my crops this year as very fine, yet every one that has seen my friend LORD NORTHLAND'S, assures me it is superior to mine ; and the BISHOP OF DERRY often has raised as fine crops ; and the BISHOP OF DOWN is now cultivating fiorin with equal success.

The proceedings of the first agricultural societies in our islands, bear record to the great crops of fiorin that have been raised within their respective limits, and that their cultivators were honoured with *premiums*, after a rigid examination by respectable members of their own, and the examination, upon oath, of those employed in measuring the area, saving and weighing the hay;—I allude to the FARMING SOCIETY, IRELAND, the HIGHLAND SOCIETY, SCOTLAND, and the BATH AND WEST OF ENGLAND Agricultural Society; who have *all* previously encouraged, and afterwards in their proceedings recommended, the cultivation of this grass, I must observe that the average amount of hay from an acre of meadow is stated by MR. CURWEN, before the discovery of fiorin, to be one ton and half to the English acre.

It has been objected, when the enormous crops of fiorin hay was stated, that this hay is not so effectually dried as common hay, and therefore must weigh heavier.

To obviate this objection, the Farming Society of Ireland, when they proposed premiums for the best crops of fiorin hay, made it a condition, to ensure its being in a quite dry state, that the weight certified to them on oath, should not be taken before March 1st.

A pupil, Mr. WATT, obtained the first premium £50, his produce of an English acre, weighed in March, amounting to six tons, sixteen hundred, three quarters, and fourteen pounds.

While mine, to which the second premium was adjudged, £30, amounted only to five tons, nineteen hundred, two quarters, and seventeen pounds.

These amounts appear on the records of the Farming Society of Ireland, short indeed of those which were often stated before, upon high authority, to have reached eight

tons: but these were weighed in November, and much loss must have been sustained by those kept until March.

The *quantity* of fiorin crops being effectually ascertained by so many respectable testimonies, it remains to establish their *quality*; and this we can do in two ways,—*à priori*, and *à posteriori*.

To commence with the *latter*; we have an excellent test of the quality of hay, *the partiality which cattle show for it*: and here we have witnesses without end.

For years the horses of all strangers that came to my house, and especially those whose object it was to obtain information on the subject of fiorin grass, were tried with it, and there did not occur one instance, except in cases of hunger, where any horse who had tasted fiorin, would touch a bundle of common hay when offered to him; for having once smelled the second sort he rejected it, and looked about for the fiorin.

My cows were often tried by the curious, and showed the same decided preference. It was a common trick with my children, to hide a bundle of fiorin hay, under a mass of common hay, and then to turn a cow to it; the beast invariably smelt the fiorin, and tossed the bundle with her horns, until she got access to it.

My sheep, in the same manner, always in winter fastened on my fiorin cock; as, for years, I built two in my sheep field to ascertain the point; and I am permitted to quote the testimony of my friend the EARL OF GOSFORD, who, having slept at my house, observed, early in the morning, all my sheep gathered round the fiorin cock, and not one of them touching the common hay.

Our proof, *à priori*, of the good quality of fiorin hay is equally decisive; the value of any vegetable food with which we sustain our domestic cattle, is best estimated by

the quantity of *saccharum* it contains; it is upon this rich juice, that its nutritive powers, as well as its gratefulness to cattle, depends; and nature seems to have bestowed on many vegetables, various portions of this delicious liquid, which in a concrete form has become almost a necessary to man.

The AMERICANS have found a new source of it in their MAPLE-TREE; and BONAPARTE, when he could obtain sugar only by enriching those whom he mortally hated, expected to extract the rich juice from BEET-ROOT.

To establish then the high value of fiorin grass, we have only to show that it contains *much saccharum*, and comparatively far more than any of the grassy tribe we are acquainted with—and this will not be difficult.

By our own taste we can make a vague comparison on this point, between fiorin and other hay. Once as I was laying down my *stolones*, a neighbour took up one of them, and said, this is the grass children chew for its sweetness:—but we must have more decided proofs.

My friend the HON. GEORGE KNOX, our first chemist, undertook to find the comparative quantities of *saccharum*, in fiorin, and common hay: I furnished him with the former, and he procured some of the best common hay in the market.

I called at the laboratory of the Dublin Society, where Mr. Knox carried on his operations. When he had reduced the residue from the two hays to a consistence like tar, that from fiorin was like rich molasses, while the other residuum was a nauseous and bitter extract.

Mr. Knox's brother, the BISHOP OF DERRY, encouraged by this, attempted to distill spirits from a decoction of fiorin hay, and completely succeeded.

I now applied to the Revenue Board for a licence to set up a small temporary still, and made the experiment *eight*

several times, and always succeeded. Many respectable persons called to witness the process. Among the rest, the MARQUIS OF DOWNSHIRE, VISCOUNT NORTH-LAND, and GENERAL M'KENZIE, who all saw the still run, and tasted the spirits.

I once tried carefully what spirits I could produce from a given quantity of hay, and obtained one quart *double* spirits from twenty-one pounds of dry hay. I do not state this as a claimant to the credit of having discovered a new source from which *alcohol* can be obtained; but as a strong, though indirect proof of the great quantity of *saccharum* contained in *fiorin*, as vegetable *saccharum* is the chief, perhaps the sole material, from which all our ardent spirits are extracted.

I proceed now, as I promised, to state the instances in which *fiorin* has *failed* to produce the advantages I expected to derive from it, of which I had boasted to the world, and to enumerate my practices and application of this grass, which I have been obliged to abandon, after having long entertained most sanguine hopes of the great advantages that would be derived from them.

I commence with IRRIGATION; a practice carried on in ENGLAND some centuries ago by the MONKS with great skill and spirit, as appeared by the works found on the monastery lands by the grantees of HENRY VIII., which they neither understood nor attempted to make use of, like their predecessors, who seem to have been most knowing on the subject.

IRRIGATION, as *now* practised in England, was the discovery of one ROWLAND VAUGHAN, who (as he tells us) got the hint from a MOLE, who, perforating an embankment, let a small stream run down a declivity, the verdant sole being much enlivened wherever the water ran.

VAUGHAN was vain of his discovery ; he published a long account of it, with numerous *Testimonia de Authore*, where the mole is not forgotten, and from some of which it appears, that the phrase *a Rowland for his Oliver* is of old standing, as the book was printed in JAMES I.'s time.

A previous acquaintance with the benefits to be derived from irrigation, was not required in the case of fiorin grass ; the luxuriance it attained in every small languid streamlet was sufficient to suggest the probability of its being much improved by irrigation.

I made several plots of fiorin which I irrigated differently for experiment, and the measure succeeded with all. In one plot I made the surface rich, but planted nothing, leaving it quite *raw*. I poured a stream over this plot also, and vegetation soon appeared, principally fiorin ; I weeded out every thing else, continued to irrigate, and in two years found this plot gave one of my best crops.

In the mean time I had been irrigating much of my fiorin meadows, apparently with great success ; and having thus fully satisfied *myself*, I published a letter on the application of irrigation to fiorin meadows, strenuously recommending the practice.

I was precipitate ; for I began to observe, where the *subsoil* was cold and retentive, that the luxuriance of the crops began to abate, and the fiorin itself gradually to vanish.

I soon perceived that the progress of these failures was proportioned to the coldness and imperviousness of the bottom, and that in the course of years my lightest, and even gravelly soils *gave up*, under the continued practice of irrigation ;—whence, though with great command of water, which I could pour upon many varieties of soil, I have *totally* given up irrigations of fiorin meadows.

I was farther induced to abandon this practice, as I

found irrigation greatly encouraged the coarse aquatics, particularly *sprit*, which I was not able to exterminate.

I proceed to the second instance in which fiorin has disappointed my expectations, and obliged me to retract my high-sounding promises ;—I mean, as affording a steady supply of valuable *winter green food*.

That such a resource for our house cattle would have been inestimable I well knew ; and when I saw my fiorin meadows affording immense crops of rich green soil, from November to March, greedily devoured by my cattle, I had no doubts I had actually obtained this great desideratum.

I tried the experiment on a small scale, while my fiorin was scant ; and completely succeeding, I recommended the practice to the world.

But when, by extending the culture of this grass, my quantity of fiorin became very great, the result was no longer the same ; for when I fed twelve or fourteen winter milch and dry cows, with fresh-cut fiorin, I observed they grew thin and out of condition.

I now watched the process, and observed my people gathered the green sward, (necessarily very wet in the short brumal days) in large heaps, where it soon soured, and became unhealthy food ; and I found, that it was difficult, almost to impossibility, to govern correctly the distribution of the unwieldy and perishable mass, to a great number of house cattle.

I have friends who ; having completely succeeded, still persist in the practice, and recommend the continuance.

Means might no doubt have been devised, under better discipline, for correcting the inconvenience I have mentioned ; and I should have exerted myself to discover them, had not a new objection occurred to the use of fiorin as a winter green food.

I began to suspect that the latter growth of the *stolones*, (that is, the end of the string,) was inferior in quality to the part nearer the root, and that the addition to its length made in the very late season, was weak and watery, adding to the *quantity* of crop, but that in very late, cold, and moist weather, *saccharum* was not formed.

Nor was this all we suffered ; for I had reason to believe that the *saccharum*, already formed in the early parts of the season, was much dissipated by lying long in the damp mat, in the winter months.

Hence arises a most important question ;—*i. e.* at what precise period do the *stolones* cease to gain, and begin to lose *saccharum* ?

I took much pains to solve it this season, and think I can safely pronounce that there was no loss of sweetness before the 10th of *October* ; of course, that our HAY mowed before that time suffers no deterioration.

My condemnation of irrigation as applied to fiorin is *decided* ; its use as a green food, for at least some part of the winter, not so desperate ; the question is still in some sort *open* to future amateurs, and cultivators of fiorin : should my own knowledge on the subject become more complete, I shall communicate it.

My friends who practise house feeding, think my condemnation of the use of fiorin in this way too decided, and are confident that by cutting the sward a week before use, shaking it out, and when aired a day, putting it in lapcock, though it may not then be quite *dry*, yet that it makes excellent food, until *Christmas* ;—I believe they are right, but I thought it incumbent on me to state my own failure.

The third instance in which I was obliged to abandon a practice that I had recommended to the world, is that of deferring to mow a part of my fiorin until spring.

This custom I gave up with much reluctance, on account of its singularity, and the great convenience I derived from throwing a part of my process of hay-making into a season when the hay was made up with the greatest facility, instead of the short December days, in which I had much to save.

The quantity I saw was greatly increased; and I never suspected a deterioration of quality, when I observed my *cattle* consuming this hay, with the same apparent avidity they eat my other fiorin.

I only feared that by deferring to mow until spring, I should injure the succeeding crop; I therefore directed my attention to this subject, and by careful experiments, ascertained that I might with great safety defer mowing until the end of March.

Accident discovered how little mischief was incurred by leaving my fiorin crop standing until a strangely late period.

I was offered a grant of land on DARTMOOR Mountain in Devon, on condition I should cultivate it as far as might be with fiorin grass.

While I was communicating with the late Colonel McMAHON on the subject, I reserved a portion of my fiorin meadow uncut, to furnish me with *stolones*, should I require them at Dartmoor.

At length the negociation breaking off, I mowed the portion on May 14th, and in the ensuing November found a sharp eye was necessary to discover the inferiority of this portion to the contiguous parts of the meadow.

I gained nothing by surmounting this difficulty; for, my suspicion of the hay losing its *saccharum* by being too long uncut, gaining ground at this time, I made the experiment decidedly, and going abroad for ten days at the end of February, I ordered all my milch cows to be fed

until my return on fiorin hay, mowed February 10th, and looking very fine, being well saved:—when I came back, I found my butter indifferent, and that the milk had lost its richness ; so I pressed the subject no farther, satisfied that it was imprudent to defer mowing until *after* the turn of the year ; leaving it to future experiments to determine how long in the preceding part of the winter we might defer mowing without injury to the quality of our hay.

Though my knowledge of the great value of fiorin was the result of *my own* experiments, the striking features, and leading qualities of this grass had not entirely escaped notice ; for the writers of the seventeenth century make such mention of it, as might have induced agriculturists to pursue the subject further ; and to ascertain *by experiment*, if a grass of such promise ought not to be introduced into cultivation, especially as both the *sweetness* and *length* of the *stolones* had been observed,—the two properties upon which the *quantity* and *quality* of its produce were likely to depend.

MR. STONEHOUSE, quoted by RAY, seems the first that mentions it,—it is noticed in FULLER's WORTHIES ; PARKINSON, in his *Theatrum Botanicum*, printed in 1640, particularly points out the sweetness of its *stolones*, which, as he says, “sometimes run to *twentie feet long*,” while RAY makes them reach *twenty-four feet*. CAMDEN mentions the *trailing dog-grass*, which obviously must have been the *gramen caninum*, *supinum*, *longissimum*, of DR. HOW ;—MORISON also makes particular mention of it ; and it is noticed in MERRIT's PINAX, published in 1666.

The only writer since that century who has mentioned this grass without abuse, is my friend WALTER SCOTT, who to his exquisite poetical talent, joins accurate observation, and careful study of Nature.

This elegant poet, noticing the bones of forgotten warriors, scattered over an ancient battle field, says,

“ The knot-grass fetters there the hand
 “ That once could burst an iron band.”

Can the fiorin grass be mistaken here?—the stolones running along the surface, occasionally rooting and fastening down whatever they cross. I acknowledged to MR. SCOTT my obligation for his correct description of my favourite.

It is true that in the treatise on the *Gramina*, written by MR. SINCLAIR, accompanying the splendid *Hortus Siccus*, which the DUKE OF BEDFORD was so kind as to send me, and upon which so much pains had been expended at WOBURN, Mr. SINCLAIR applies Mr. SCOTT's description to another grass.

Had Mr. SCOTT studied Nature in the *South of England*, and had the battle he refers to been fought in that country, Mr. SINCLAIR might have been right; but where SCOTLAND is the scene of action, I answer for it no grass but the *agrostis stolonifera* has a claim to Mr. SCOTT's correct description. I speak with confidence of the natural produce of the Scottish soil, having examined it with much attention, and in a great extent of country.

The *Aborigines* of the British Isles seem to have been at all times acquainted with the value of this grass. I have had repeated proofs transmitted to me, that the early SCOTS knew it to be a sweet and good grass.

The WELSH also claim it; and DR. PUGH labours to prove that the verdant meadows in OWEN GLENDOWER's DEMESNE IN GLAMORGANSHIRE, were composed of fiorin.

I myself found that the natives of a wild part of DON-

NEGAL, were well acquainted with fiorin, that they charged a higher price for this than for common hay, and that it was the custom to buy it for sick cattle, long antecedent to the recent notice taken of it.

I have often lamented that my efforts to introduce fiorin culture into those parts of the British Isles whence the ABORIGINAL CELTS had been expelled by the SAXONS, had always failed, and that I had completely succeeded in ENGLAND but in one instance;—even here my fair and noble pupil was herself a *North Briton*.

ENGLAND seems a sort of NON-CONDUCTOR, and stops the passage of fiorin to those countries that are desirous to cultivate this valuable grass: the DANES would have been deprived of the benefits for which they are now so grateful, had they not contrived to obtain it through another channel, and fiorin found its way to my imperial pupil the ARCHDUKE, not through ENGLAND but DENMARK.

I myself have been unable to procure attention to the subject, or a passage for my instructions, through the channels of office most interested in the growing prosperity of the important colony of NEWFOUNDLAND, where the soil and climate are admirably adapted to this hardy grass, and where hay now sells at twenty pounds per ton.

The prejudice of the English against fiorin may in some sort be accounted for, by the perpetual intrusion upon them of an inferior variety, the *agrostis vulgaris*, hard to distinguish from the true *stolonifera*: happily, the former is not able to sustain colder climates, and thus in IRELAND, SCOTLAND, and DENMARK, we escape from it.

I have shewn that the writers, both agricultural and botanical, of the seventeenth century, had taken such notice of the *agrostis stolonifera*, as might have induced their successors to form good expectations from it, or at least to pay it some attention; but I was quite mistaken, for nothing

similar followed. These latter gentry seem to be as little acquainted with the writings of their predecessors, as with Nature herself, and to have taken no pains to improve their acquaintance with her, either by actual experiment, or further observations on this grass.

They had indeed made a most important discovery, to wit, that agricultural *book-making* was a most lucrative trade; for that the public, anxious to acquire agricultural knowledge, bought whatever was published on the subject.

There were enough ready to gratify them, and, without taking the trouble to shew how they had acquired the knowledge they were so ready to communicate, *pronounce* upon all agricultural subjects, *professoria lingua*, as if their authority could not be disputed.

It is not surprising that the readers of these compilations should not easily be convinced of the value of the *agrostis stolonifera*, when they find their *habitual instructors* talking of this grass with so much contempt.

I shall state what some of these gentlemen are pleased to say of it.

I commence with MR. DAVIS, the oracle of the WILTSHIRE agriculturists; he says, "The *agrostis stolonifera* is one of the worst grasses, the peculiar plague of the farmers in the S. E. district of Wiltshire"—"it is of that coarse nature that no cattle will eat it."

MR. DON dreads "lest under the recommendation of old STILLINGFLEET, any *agrostis* should be cultivated." Again, particularly mentioning the *agrostis stolonifera* among the grasses not eligible for cultivation, he says, "there is no species of *agrostis* that cattle are fond of,"—"there is no reason to believe that any of them would answer for hay;" yet my late friend GENERAL VALLANCEY sent me from the DUBLIN SOCIETY some

seed of the *agrostis stricla*, sent to the society from AMERICA, as the best meadow grass, and the one chiefly sown in that Trans-Atlantic country.

It even appears that MR. DON had got some hints on the value of this grass, which he treats with contempt; he says, "Some gentlemen of considerable observation and experience have thought, that the *agrostis* was an eligible plant for cultivation, and that it makes good hay; but to this I am persuaded no practical farmer would agree."

He says, in another place, "a stranger is often astonished at the apparent luxuriance of this useless grass."

He proceeds by *ejaculation*—

"How much then must it interest the cultivator of such a soil, to discover a grass that might thrive as well as this, and at the same time afford nutritious food for his cattle!"

MR. DON would rather cant and complain, than trouble himself to try with patience, whether the luxuriance that he admits he observed, might not supply his great DESIDERATUM, *nutritious food for his cattle*.

Mr. Don concludes with an amusing apostrophe: "Improvident Nature! could you not, to enrich the agriculturist, have endowed some other grass capable of affording nutritious food for our cattle, with that enviable luxuriance so provokingly displayed by this useless grass?"

Thus it appears, that NATURE, not content with supplying MR. DON's great desideratum, *a grass that will afford nutritious food for our cattle*, but also that this same NATURE, having obtruded it in various ways on these wise book-makers, and repeatedly on MR. DON himself, is charged with *improvidence* by this agricultural oracle, and this through a publication calculated to convey instruction

to their uninformed countrymen, THE TRANSACTIONS OF THE HIGHLAND SOCIETY.

Nor is this the only instance I shall produce of the mischievous use made of this well-intended publication, by ignorant book-makers, puffing their approaching publications through this respectable channel.

I shall limit myself to one quotation more, and that from a book of great circulation, MR. ARTHUR YOUNG'S *Annals of Agriculture*.

MR. SMITH boasts there of a victory he had obtained over a troublesome enemy, which he calls RED ROBIN. He says "his field had run to RED ROBIN to such a " mischievous degree, that to walk over it was like treading on a cushion," (the description given of florin grass by both friend and enemy); and Mr. YOUNG himself is so good as to inform us, that *Red Robin* is the *agrostis stolonifera*.

MR. SMITH proceeds, "This *Red Robin* by neglect had " over-run his grounds to a very great degree;" adding, " that any sort of stock would starve rather than touch " its herbage." We have thus Mr. YOUNG'S authority for the identity of *Red Robin* with the *agrostis stolonifera*, and for the aversion of all cattle to the latter.

The seedsman, as well as the modern agricultural writers, have declared war against florin; the BOARD OF AGRICULTURE gave some *stolones*, received from me, to MR. SALISBURY, to make experiments on: he pronounced them to be *couch grass*, and was indignant at being supposed capable of cultivating so vile a weed—he who had been regularly educated under the celebrated MR. CURTIS; and some respectable strangers have lately written to me, requesting me to tell them how they are to get into florin stock, as the London seedsmen refuse to supply

them, assuring them, it is *now* ascertained, that the eulogia pronounced on this grass are not merited, the whole story being a mere *humbug*.

I have not yet got over all the difficulties I have to surmount, nor detailed all the opposition I have to encounter in my endeavours to benefit the world, by making them acquainted with this valuable grass; its favourite soil is attacked, and pronounced to be incapable of producing any crop worth the attention of man.

PEAT MOSS I have often stated to be a most favourable soil for florin: yet the book-making gentry pursue *peat soil* with the same inveterate hostility they wage against florin itself.

What seems most extraordinary is, that these condemnations of *peaty soil*, come almost exclusively from NORTH BRITAIN. Now I believe, that the unimproved and unproductive surface in SCOTLAND, bears a greater proportion to its whole area, than in any other parts of the United Kingdom; and of this neglected and condemned surface, I have no doubt, that if we exclude stony tracts, and inaccessible elevations, nine-tenths of the remaining surface is *peaty soil*, and this is the object of these gentlemen's reprobation.

Our surprise will be increased when we look to the theatre upon which these anathemas against peaty soil are pronounced, and the vehicle through which they are conveyed to the world;—no other than the HIGHLAND SOCIETY and its *transactions*.

This body, for which I have the highest respect, instituted for the purpose of promoting the improvement of their country, is made the tool of mercenary speculations, and innocently seduced to give their sanction to the false and wicked position, that nine-tenths of the unproductive parts of their country is incapable of further improvement.

In the 3d vol. *Trans. Highland Society*, page 18, it is said,—“ In the Northern parts of Britain, a considerable
 “ part of the earth’s surface is occupied by the vegetable
 “ matter known by the name of *peat*, which, being in its
 “ natural state unproductive of esculent vegetables, sets
 “ narrower bounds to national industry.”

Is not this a positive assertion, that *peaty soil* is beyond the pale of improvement, and that the exertions of industry would be thrown away upon it?

Page 28, it is said,—“ its incapacity of producing vegetables capable of being cultivated in its natural state.”

Page 39.—“ The natural incapacity of peat to produce
 “ esculent vegetables results from”——

Here the Author, not content with *asserting* the unproductiveness of peat soil as a matter of fact, proceeds to give wise reasons, *à priori*, why it ought to be barren and *unproductive*.

Page 40.—“ As peat does not yield to corruption, growing plants can derive no food from its spoils.”

Page 82.—“ I have thus attempted to examine the
 “ nature of that unseemly substance, by which a large
 “ portion of the earth’s surface in these regions is laid
 “ waste,—investigating the causes of its natural sterility.”

I must observe here, that all this abuse of peaty soil is directed against its *natural state*, its *natural incapacity*, its *natural sterility*; and that notwithstanding this tirade, the efforts which I have lately been exerting myself to call out, have been much limited to *peaty soil* in its *natural state*, and to the *widely-extended area* gravely pronounced by such high authority, to be *beyond the bounds of national industry*.

There are many other wise writers who wage war against this unfortunate *peat soil*; but I shall quote only one more, who says, “ The *sterility* of moss is a quality of much

“ more importance than any of those that have been mentioned; to endeavour to account for it, shall be my object in the following Essay.” Again, “ The conviction of the absolute sterility of moss is so deeply rooted in the minds of nine-tenths of mankind, that every attempt to convert it into a soil is regarded as *foolish*, and given up as a *forlorn hope*.” He proceeds,

“ The very name of that substance, in all languages, and all ages, signifies *sterility*.”

CHEMISTRY affords this gentleman powerful aid in his war with *peaty soil*; for he elaborately shews, that every deleterious principle, every noxious element, are all assembled in this unhappy substance—*peat*.

I shall quote but one passage more:—“ The man who discovers the latent causes of this sterility of all mosses in general, and of each species in particular, will deserve well of his country, perhaps of all Europe.”

I am curious to know what claims this gentleman will pronounce me to have on my *own country* and upon *all Europe*, when I shall make it appear, not only that this sterility has *no existence*, but that I can raise on *peat soil*, in its *natural state*, and in the very area condemned by the HIGHLAND SOCIETY, as *beyond the bounds of national industry*, crops of hay, more valuable than any now raised in the county of MIDDLESEX, with the aid of London dung.

To shew that I can actually do so, has been long a favourite object with me; and all I ask is a fair opportunity to make the trial in the face of the world; and I hope the vicinity of the field of action to our metropolis (the peaty mountains just above it) may tempt the proprietors of the soil, perhaps our VICEROY himself, to make experiments, the result of which, if favourable, would be of such incalculable national importance.

My ignorance of the soil through the AUSTRIAN dominions, precludes me from knowing if my IMPERIAL PUPILS be interested in the improvement of *peaty soil*; but their brother the EMPEROR'S territories abound with *mountains*, and these afford the finest field for raising floricorn in the greatest abundance, whether by *cultivation*, or the more recent mode to which I am coming, of rousing the efforts of spontaneous nature, to clothe these alpine surfaces with either luxuriant meadow, or grateful pasture; and their Highnesses may live to see the JULIAN ALPS, and the CARPATHIAN Mountains, affording as abundant sustenance to their cattle, winter and summer, as is yielded by their richest low countries.

What satisfaction must it afford to the ARCH-DUKE JOHN to revisit the JULIAN ALPS, so favourite a country with his Highness, and to call forth the exertions of the spirited and loyal TYROLESE, to the improvement of their country, which he had in more unhappy times so effectually roused for its defence! what pleasure must he feel in adding to the comforts of a people so affectionately attached to his IMPERIAL HOUSE, and in witnessing the gradual amelioration of a country so lately a scene of desolation, but now rising under his own eye, and by his own instructions, into higher prosperity than they enjoyed before the calamitous war in which they acquired so much glory!

I now proceed to the most important application of floricorn grass that has yet occurred,—a mode of raising luxuriant crops, so paradoxical, that it was years after I had made the discovery before I ventured to communicate it to the world; for when I saw the efforts of agriculturists to cultivate the *stolones*, I saw them generally fail, and especially in ENGLAND; how could I expect to be believed, when I should say that this grass would grow *spontaneously* on grounds where it was neither sown nor planted, and,

by the force of Nature alone, produce crops equal to the best I myself could raise, with all my experience of the habits of this grass, and the culture adapted to it? And to make the paradox the more revolting, that this could be done on our *worst* more effectually than on our *better* grounds, and best of all on the area pronounced by the wise writers I have quoted, *to be incapable of improvement by the efforts of national industry?*

The position that I could save my fiorin hay with ease through the *brumal months*, had sufficiently strained my credit, to discourage me from hazarding a new paradox: yet, as in this case I had been able to prove from sound philosophical principles, that the antiseptic quality of fiorin hay, by which it was protected from spoiling like other hay when exposed to severe weather, was a necessary consequence of the singular properties with which Nature had endowed fiorin grass.

In like manner I shall be able to shew, in the case of this *new paradox*, that the facility of raising *spontaneous* crops of fiorin at great elevations, is also a necessary consequence of the habits and properties of this *agrostis*, of which we are able to avail ourselves when thoroughly acquainted with the steady and regular process of Nature, in clothing our surfaces with a grassy sole.

The circumstances that led to the discovery of these two paradoxes, and to the establishment of their truth, were the same in both cases. Solitary facts obtruded themselves, attracted notice, and excited curiosity; experiments followed, and soon shewed, that what might have been taken for solitary instances, were in the regular course of things, and the steady process of Nature.

The next step was to develop the principles upon which each of these strange paradoxes depended; and I succeeded in both, being able to prove that the *effects*, which

at first had excited so much surprise, were the results of natural causes, and necessarily followed from the characteristic and unalterable properties with which Nature, at its original formation, had endowed the vegetable in question.

The value of every discovery, at least in agriculture, is to be measured by the benefit which man is to derive from it; that of florin itself, by the great addition it makes to our stock of winter provender for our cattle, by the superior luxuriance of its crops, and the greater facility of raising and keeping them up.

The *actual* value of the discovery of our power of saving florin hay through the *winter months*, may not *in itself* be very great; yet it enables us to abstain from mowing this grass, until the stolones attain their perfection, that is in *October*, as we are now secure in saving its hay, whatever severity of weather may occur in the very late season in which we are to make it up.

This strange practice too may teach gentlemen not to make so flippant a use of the term *impossible*, as they often do, unless they mean to apply it in FIELDING's sense of the word, "*as signifying not only what is very probable, but frequently what has actually happened.*"

The value of the discovery that florin grass can be *cultivated at great elevations, on peaty soil, at light expense, and luxuriant crops of hay raised there*, must at first view appear immense, to those who are acquainted with the vast extent of this area in our islands, and who know how miserably the cattle of the inhabitants are stinted in winter provender. How greatly must this value be enhanced to those who have given credit to the grave positions quoted above, that this whole area is *unimprovable* even by the efforts of national industry?

Can we rise higher in this climax, and give to our discovery a still greater value? YES;—for I shall shew, that in such soil, and at such altitudes, even *cultivation* can be dispensed with, and the weak grassy sole clothing the peaty surface, be converted by the spontaneous effort of Nature, under very slight encouragement, into permanent and most luxuriant fiorin meadow; a change effected every where in these dreary regions with the greatest facility; while in the lower country, and in the richest soils, we cannot effect this conversion, except where we accidentally meet with favourable circumstances, and even then not without considerable labour and watchful attention.

To procure countenance and co-operation, in establishing the truth of these two paradoxes—to wit—THAT fiorin can be *cultivated* to great advantage in our bleak elevations, hitherto deemed unimprovable; and also THAT the natural, grassy sole of the place, in the same situations, without *sowing* seed, *planting* roots and stolones, or breaking the surface, can be in the first year changed into a luxuriant crop of meadow,—are subjects of the last importance; and I hope I shall be excused for going into their subject at such length.

In confirming these two positions, I shall adopt the same style of demonstration I have used in other cases.

I first establish the FACT, and then develope the PRINCIPLES from which it results.

I produce testimonies, and point out the places where these measures have already succeeded; and I hope to be permitted to repeat the experiments on a favourite theatre, admirably adapted to the purpose, and easily accessible to the amateurs of our own capital.

I then shew from the natural history of fiorin grass, that these results were to be expected; and I state the observations I have made on the habits of this vegetable in

its wild state, and which will equally obtrude themselves on every person who chooses to examine the field I have selected, and hope to see consigned to my operations.

These, as they originally excited *me* to make experiments, will, I hope, encourage others to follow my example; and I am sanguine enough to expect, that in my own country I shall soon hear, the northern face of the WICKLOW mountains has been encountered, and that my Imperial pupil is trying to call out the spontaneous efforts of Nature on the *Julian Alps*.

The first instance that occurred to me, of fiorin grass clothing the surface *spontaneously*, and yielding a rich crop of hay, without any interference of mine, was in the year 1808.

I had directed that so soon as the new cut turf should be removed from the surface whence they had been taken, that the ground should be laid down with fiorin grass, and also that a contiguous portion of green surface, under which the peat was too shallow for cutting, should be *dug*, and laid down with the rest.

On my return home late in September, I found this latter patch (five or six perches) had not been touched: on inquiring why my orders had not been obeyed, some excuse was made, and I was told there were plenty of natural fiorin roots in the place.

I had not time to lay down this piece regularly; so determined to ascertain by experiment, what this natural sole would turn to.

I immediately weeded out coarse weeds, and irrigated the patch regularly: under this process it gave me a magnificent crop of pure fiorin in 1809, and another in 1810. The aquatic weeds now were becoming strong, and in 1811 abated the luxuriance of the crop; I therefore abandoned irrigation, drained the patch, and top-dressed

it: under this process it immediately resumed its luxuriance, and continues to this day, to give me as fine crops of florin as my most highly-cultivated grounds produce. In 1809, my late dear friend and pupil, the Right Honourable ISAAC CORRY, saw this patch mowed, and gave an account of its magnificent crop in a letter to the late Speaker, MR. ABBOTT, which he published.

Four years afterwards the Bishop of Derry saw this patch mowed, and weighed a perch of the green sward, which equalled the best crop I had ever cut.

The power of florin grass to take entire possession of the surface under favourable circumstances, was confirmed to me by other observations; and I learned what circumstances would produce this strange effect: still, however, I had not courage to press so extraordinary a paradox on the world, as that a grass hitherto little noticed could be made to produce spontaneous crops, far superior to those which our best grasses were used to give, under the most skilful cultivation.

At length, in autumn 1814, I received a *joint* account from my friends GEN. SIR JAMES STEWART, Coltness, SIR A. M'KENZIE, and COL. LOCKHART, of a magnificent crop of *spontaneous* florin, that had been found in the demesne of the last gentleman, member for SELKIRKSHIRE; and these respectable amateurs were so good as to transmit to me, a certificate of the *weight* of the crop, with the *measure* of the area from which it had been cut, taken by a regular surveyor; the amount by the area, pretty much the same with that weighed by the BISHOP OF DERRY on my own meadow.

Finding my paradox confirmed by such respectable testimony, I no longer hesitated to bring it before the world, and to authenticate it in the best manner I could.

I selected one of the worst spots in my demesne,—poor

meadow, with a cold retentive bottom, of *sandy clay*; this patch, which never had been broken up, nor manured, annually yielding a wretched crop of coarse spritty hay.

I called on my neighbours, the EARLS OF CALEDON and GOSFORD, requesting them to come and inspect a wretched piece of ground, on which I promised to raise, in the course of the year, a crop of hay of superior quality, and *double* the amount of any grown in Ireland that year.

My noble friends were so good as to obey my call, and inspect the ground in February 1815, in its natural state: they were much amused at my promise of raising a great crop of hay, from so miserable a soil; and still more when I assured them, I should neither break the surface, sow seed, or plant roots, or perform any other operation, than *draining, weeding*, and top-dressing with moor and ashes burnt contiguous.

In *October* of the same year, I gave my noble friends notice I had performed my promise, and was ready for inspection: they came in November, attended by friends, on whom I observed them impressing the wretched state in which they had seen this piece (forty-eight perches) nine months before, but now covered with an immense crop, some in lapcock, but the greater part uncut—different portions of which were mowed before them. The two Earls authorized me to say, that the crop seemed *treble* the amount of those they were used to see cut.

The crop produced in this patch in 1816, was still better; and in 1817, when mowed a month earlier, was very fine; since it was cut, an unusually *dry October* enabled me to save it without a shower. When it had stood a fortnight in trampcock, it was weighed in November, in a drier state than I ever saw my hay weighed before; and, by affidavit of the weighers, came to five tons, six hundred, three quarters, at eight stone the hundred, to the English

acre; it was mowed October 2; had it, as usual, stood another month, it would have weighed a ton more.

I shall quote but one instance more, among many that have occurred, of florin occupying the surface in great luxuriance *spontaneously*.

My friend and florin pupil, A. YOUNG, ESQ. was cultivating this grass with much spirit and success, on the PENTLAND HILLS, when I wrote to him to try what spontaneous Nature would do, without breaking the surface as he had hitherto done.

Mr. YOUNG replied, that so soon as he had received my letter, he took to the scene of his cultivation, Mr. BAIRD, of SHOTTS, the most successful grower of florin in SCOTLAND; that they observed, contiguous to the cultivated part, a small portion which had not been broken up, and that upon this, he had a better crop than where he had laid down the florin carefully. My friend now lamented that he had broken up any of his grassy surface.

Having established the FACT of the facility of throwing grassy surfaces into great florin crops, I as usual proceed to the principles upon which this *new* style of proceeding depends.

I have for a long time paid great attention to the component parts of the grassy sole clothing our soils of various descriptions, and at all elevations; and have observed that Nature invariably mixes a very great variety of grasses, and nearly the same in all soils, however different from each other; that of these, those which are best adapted to the particular soil, come forward in vigour, assume the predominance, and seem to be in actual possession of the surface, while the grasses to which the soil is *ungenial*, continue in a sort of dormant state, preserving, but not shewing their existence.

It is of great importance to establish the truth of this position, so as to secure conviction; for the success of the measures I am proceeding to, depends upon the confidence placed in its truth.

I am not now, as often before, discussing questions relative to the *gramina* in general, or proceeding to shew how the above position, or maxim, may be so applied, as to derive various benefits, to agriculturists from its application. I am at present limited to one grass, the *agrostis stolonifera*, and have only to show how we are to call this particular grass into action, and how we are to contrive to make it come forward of itself, and to take possession of our surface, in valuable luxuriance, in a field where great crops are little expected.

The effectual inclosure and amelioration of a few perches of the most elevated grassy sole, contiguous to the military road, in its ascent to the Wicklow mountains, will soon shew what Nature of herself can do in my own country; while a similar experiment in the JULIAN ALPS will determine whether the *agrostis stolonifera* be the predominant possessor of these more southern elevations, and whether it luxuriates with the same vigour in these regions, it displays in our own more inhospitable wilds.

As the *agrostis stolonifera* is the only grass I have discovered, of which such important use can be made as I have promised, I shall proceed to examine as much of its natural history as is necessary, and to state the properties it has derived from Nature, by which it is enabled to furnish such a profusion of winter food to our domestic cattle, in the very regions where it is most wanted.

Our other stoloniferous grasses of great luxuriance, and abounding with saccharum, the *aira aquatica* and *festuca fluitans*, are decided *aquatics*; while the *agrostis stolonifera* is *amphibious*, with powers of sustaining the

extremes of wet and drought, to an extent that will scarcely be credited ; but I speak from experience.

Making a dam for the purposes of irrigation, I flooded a ditch, with fiorin growing at the bottom. This was covered *twenty-two* inches deep, and for four years the roots regularly sent up stolones to the surface of the water, in good health ; and probably would have continued to do so, had not the floods of a rainy winter filled up the ditch.

Nearly at the same time I tried the other extreme, and planted a fiorin sod on the top of my garden wall, ten feet high ; here, without being watered or approached for four years, it continued vigorous, dropping every year a bunch of stolones, twelve or fourteen inches long ;—nor did this root die a natural death ; it was destroyed in putting an additional building against the wall.

Though this grass preserves its existence, and even its health, under such opposite extremes, it luxuriates into value only under more favourable circumstances, for the soil in which it grows must be tolerably deep, and well drained, so as effectually to prevent any water stagnating about its roots.

Another curious property of this *agrostis* is, that it thrives and luxuriates equally at the *top* of the mountain and *bottom* of the valley, indifferent to any changes in elevation. I even proved on the spot, to my friend SERJEANT FOY, and some members of the Farming Society, that fiorin was *more* vigorous towards the summit, obviously because the rivals that crowded it lower down, left the *alpine field* to this hardier grass, unable to sustain the severities of the climate.

I have said enough to shew that to *cultivate* fiorin grass at great elevations, is no very desperate attempt ; for we may surely expect, that a vegetable fostered by man, protected from its enemies and rivals, and stimulated by

manure, will thrive and luxuriate in the very same situations where it comes forward spontaneously, and grows vigorously, without any of these helps.

But this is not all; for although it may be often necessary to cultivate floricorn with care and labour in alpine regions, I have promised that it shall grow there without culture, and produce *spontaneous* crops of equal value to those upon which we expend our labour and pains in any country, *high or low*.

To establish these extraordinary positions, I must recur to general principles, and shew that what I promised is not incompatible with the regular proceeding of *Nature*, though my measures may be very different from the usual proceedings of *man*.

Let us examine the population of the vegetable kingdom, as originally disposed by *Nature*, and we shall find on every part of our surface an heterogeneous mass of plants, crowding upon each other, and contending for the possession. Among these, man soon perceived, or was taught, (whether by instinct or otherwise, is foreign to our present object) that some were well adapted for his sustenance; nor could it be long before he discovered, that from these favourite vegetables, he could extract but little food, so long as they remained in their natural state, pressed upon by rivals, impeding their growth, and diminishing their produce.

The idea of giving to these favourites the exclusive possession of *some* area, must soon have occurred: hence distinct cultivation, that is, *agriculture*; which I have somewhere defined, *a war between Man and Nature, contending for the possession of certain portions of our surface*.

That cultivation is an actual *war* is obvious; for man commences by *extermination*: he ploughs the ground, for

the purpose of destroying every vegetable that Nature had put in possession, and then sows his own seed, or plants his favourite ; repeating the same operation for every distinct crop he looks for, to the exclusion of all others.

I believe I am the first that sought to obtain an exclusive crop of a favourite vegetable by less violent means, that used conciliation, and compounded with Nature, not *obtruding* any favourite of my own, but selecting, and fostering one of those she had already put into possession.

The general rule for calling one of these into more luxuriant vegetation, giving it the predominance, and, if we can, the *exclusive* possession, is simple: select from among your natural green soles, a portion whose soil is congenial to the vegetable you wish to bring forward,—enliven it with the manure that agrees best with your favourite ; and relieve it by *weeding*, from the rivals that crowd upon and encumber it.

The particular rule for giving exclusive possession of our grassy surface to the *agrostis stolonifera*, is derived from the character and habits of this grass.

The soil in which it delights most, is *loose, dry*, and of some *depth*, whether peaty or loamy ;—any manure suits it, and it agrees particularly well with *ashes* and *lime*, pure, and still better if mixed up in compost.

I say the soil should be *dry* ; this is indispensably necessary : but I prefer a soil *made dry* by many surface drains, to one naturally so ; for a soil kept wet, by a retentive bottom refusing a passage downwards to the deluges of rain, is clothed mostly with the grasses that affect such soil, and some *fiorin* among them. Change the nature of the soil, from *wet* to *dry*, from *poor* to *rich*, and the paltry ungrateful aquatic occupants pine and vanish ; while the *fiorin*, now in its favourite soil, comes forward in luxuriance, and takes possession.

I admit that in the great mixture of vegetables occupying every green sole, there are some, which, with the fiorin, like a dry and rich soil : these, so long as the soil was sour and ungenial, remained in a dormant state ; but now that we have made it *rich* and *dry*, they, with the fiorin, rush into luxuriance, and would crowd ; but here we come in aid of the fiorin, and weed out these rivals.

In this operation we are much assisted by the habits which fiorin has derived from nature ;—first it luxuriates at a very late period, whence its rivals of early paroxysm of growth come forward in vigour long before it, and point themselves out for extirpation.

Secondly,—the paroxysm of fiorin luxuriance, though very late in commencing, continues much longer in vigour than that of any other vegetable I know ; so long, that its stolones form a thick mat on the surface, under which no other vegetable can exist :—thus, while coarser rivals are pointed out for *man* to extirpate, the fiorin itself suffocates, and exterminates the more diminutive ones, and remains in exclusive possession of the field.

Still, however, that possession must be watchfully guarded, and the destruction of intruders never intermitted. *Weeding of meadows* is a new task, disagreeable, and often omitted, and the consequence always fatal ; yet it is not *very weighty*, as I contract for the weeding of all my fiorin meadows at five shillings the English acre annually.

It should seem that the measure of raising spontaneous crops of fiorin, was *equally* practicable from all grassy soles of three or four years standing, where Nature had time to form her own mixtures ; but in *practice* the case will be found very different in different descriptions of ground.

The sole impediment to our success, arises from the ob-

trusion of rivals, crowding upon and interfering with the growth of our florin.

Our natural grassy soles may be considered as of *three* descriptions;—that covering *rich* low grounds, *poor*, *sour* low grounds, and *green mountain*; each assumed to be sufficiently deep.

In *rich low grounds*, our attempts to give florin the *exclusive* possession would be vain, the rush of obtruding rivals being quite irresistible.

In *cold, sour, low lands*, we have a better chance of succeeding, because the change we must operate on the soil, will be injurious to the rivals in possession, and we may be able to weed out new intruders.

It was upon such soil I succeeded so well in the instance I have mentioned, where the EARLS OF CALEDON and GOSFORD were so good as to witness my proceedings.

Of all low grounds, *flat, moist, green, peat moss*, is best adapted to the production of spontaneous florin meadows; for, in addition to the change we must make from wet to dry, peaty soil is congenial to florin, and unfavourable to its rivals, and it affords an inexhaustible source of manure, more agreeable to this grass than any other, PEAT ASHES.

MOUNTAINS are the true field for raising valuable crops of spontaneous meadow: our agrostis is *already* in predominant possession of all verdant high elevations in our own mountains; and few efforts will be required to give it the exclusive possession, as very few of its rivals are enabled by nature to sustain alpine severities; while florin is proved to luxuriate equally on the top of the mountain, and bottom of the valley. The declivities too of the surface, make drainage an easy task, and in all the mountains of our islands, peaty soil is predominant.

The metropolis of Ireland is contiguous to an immense area of mountain, admirably adapted to improvement by

fiorin. *Twice*, at the request of the **IRISH FARMING SOCIETY**, I have visited and examined this dreary territory, and reported on its aptitude for fiorin cultivation; engaging to supply the city of Dublin with all the hay requisite for the numberless horses it feeds, from grounds hitherto deemed unprofitable.

My speculations were then limited to the actual culture of fiorin; for I had not at that time discovered the facility of raising immense crops of this valuable grass, without the trouble and expense of cultivation, by substituting the spontaneous efforts of *Nature* to the labour of *man*, in preparing our surface.

So soon as I was convinced of the feasibility of my new measures, I tendered my services to the Society, offering to superintend their execution myself: the Society was pleased to accept my offer, and a day was fixed for my waiting on them at their **HOUSE**, to arrange proceedings; unfortunately, in the interval, the excellent state of health which I had been blessed with to a late period of life, was interrupted, and I was no longer equal to the requisite exertions.

But still my pen is ready; and should I have roused a desire to improve the wilds of Nature, I am still able to direct the exertions of spirited amateurs; and whether they are about to be made on the **SCOTCH MOUNTAINS**, where I am already employed,—on the peaty **WICKLOW MOUNTAINS**, to which I have long looked with a wishful eye,—or to the new theatre I should be happy to open, the **JULIAN ALPS**,—I am still able to *direct* the operations I can no longer superintend, and to communicate with the amateurs of any country who shall call upon me, and make me acquainted with their local circumstances, that I may teach them how to avail themselves of them.

Though mountains be my immediate and favourite ob-

ject, I am ready to encounter STERILITY in any form. Certain that the accommodating fiorin, under proper management, would clothe with verdure, and of course pasturage, many fields now assumed to be consigned to perpetual barrenness, and having got my foot in GERMANY, I should like to make an experiment on the BRANDENBURG heaths, at present so dreary and desolate.

Since I commenced this Memoir I am called upon to a new and very promising field, *the marshy* (and I presume alluvial) grounds bounding the great American rivers.

Mr. SWARTSWOUTH of NEW YORK, encouraged, as he tells me, by the successful experiments of JUDGE PETERS and others on European fiorin grass, is most anxious to have my opinion on the probability of its succeeding on the marshy banks of the NORTH RIVER, so as to enable him to supply the city of NEW YORK with hay.

I had formerly declined to encourage the gentlemen of BOSTON to cultivate this grass; for finding I had been unable to persuade my *English* pupils to keep the fiorin I was teaching them to cultivate free from weeds, I feared I should also fail in NEW ENGLAND, where the rush of summer vegetation was so much more powerful.

I have given more encouragement to Mr. SWARTSWOUTH, and have transmitted to him full directions how to call into action the spontaneous fiorin which I know exists in the marshy grounds, and how to apply the measures I have already so minutely detailed in this Memoir to the repression of its rivals, and to the transfer of the exclusive possession of his marshes to the grass he wishes for; strongly impressing on him the indispensable necessity of his own constant interference in the extermination of intruders, as well as in the careful discharge of all water by most numerous surface drains leading to sluices with outward opening valves.

What a field for improvement does our CHESTER DEE afford! I have had fiorin stolones sent to me from its muddy and sandy banks *below* high-water mark, for this strange grass agrees equally with fresh and salt water.

I am proud to see my favourite passing, not from individual to individual, but from nation to nation, from IRELAND to AMERICA and DENMARK, from DENMARK to GERMANY and HOLLAND, travelling like rhetoric of old :

*Gallia caustidicos docuit lucunda Britannos,
De conducenda loquitur jam Rhetore Thule.*

APPENDIX.

Directions for laying down and cultivating Fiorin.

I MUST not forget, however important the discovery may be, of our power to raise luxuriant fiorin crops by the spontaneous effort of Nature, (upon which I have dwelt so long,) *that the actual cultivation* of this valuable grass is not only of great consequence, but the object immediately in view that occasioned the flattering call I have received, and to which I am bound to pay the most profound attention.

I shall therefore lay down the very short rules, which those who wish to *cultivate* fiorin should be governed by, and shall suggest the alterations in our measures, which I think *may* be necessary under a warmer sun, where summer vegetation is probably more vigorous than in our own moist and more languid climate.

In the first place, I wish the soil to be *deep*; for although fiorin roots penetrate but a little way below the surface, yet it is of very great importance, that the loose and well-tilled soil should reach much lower.

The ground should be already *dry*, or *made* dry, by many open surface drains; for if water, whether atmospheric or other, be allowed to collect and stagnate about the roots of the grass, it soon becomes acrid, and highly injurious: this rule is *indispensable*; yet occasional floodings, or even long submersions, do not seem in the least to injure this grass, if rapidly let off.

Fiorin must have the exclusive possession of the surface, that is, all intruders, especially other grasses, must be carefully weeded out, whenever they appear. I may add, the surface must be frequently *top-dressed*; and these renovations will abundantly repay the trouble and expence they occasion.

In laying down fiorin crops, we neither use *seed* nor *roots*, when we can procure *stolones*, of which every cultivator has a superabundance; and the mode of proceeding is very simple.

We commence at one end of the prepared area, and scatter stolones, at their full length, over a space extending along the fence, and about three yards wide. I cannot determine how thick they are to be spread; we know that nearly every joint will strike a root, and we must take care to secure roots enough.

We now from the raw ground behind us take up shovel-fulls of the loose surface soil, and scatter it over the stolones, so as *nearly* to cover them, and thus the business is done for so far: we then take up another breadth of three yards, spread strings over it, and cover them in the same manner.

Where we have tender rich compost, ready prepared, it is more desirable to drop loads, or barrowfulls of this, through the field, and to cover the stolones from these, rather than from the plain surface.

It is thus I have clothed all my own meadows with fiorin, and I know not any *annual* crop laid down so cheaply; for the stolones cost us nothing, and it is not a crop for one year only, as I have now my tenth and eleventh crop in full luxuriance; and the sole of grass never seemed to require any style of renovation save top-dressing.

Weeding, indeed, must be repeated, as often as intruders appear; and I do not find the labour lessens with the age

of the meadow—but my contractor seems to think he has a good bargain, at five shillings per English acre.

Where the object of the cultivator is to *get into stock*, and he has to procure his roots or stolones from remote places, he must use them more sparingly, and scatter the stolones thinly, or plant the roots at a greater distance; and to throw them into higher luxuriance, he must be liberal of his dung, or compost, which he can probably well afford, as, in the case I put, his area will be small.

I would also in this case adopt the style I used in laying down my first crop, as stated in page 9; for by stretching them *in drills*, we economize the stolones: the early weeding by the *iron rake* will be very effectual, and the well-defined narrow drills will be easily weeded by hand; and in the instructions I sent to their Imperial Highnesses, with the roots and stolones I transmitted to them, I recommended the adoption of this mode, which I was further induced to do, by ignorance of the intruders to be expected in a new country under a warmer sun.

SEED, no doubt, presents itself as the most obvious mode of laying down and propagating any grass; and Nature has enabled this *agrostis*, as well as the rest of its tribe, to throw up great crops of seed, most easily saved: but the growth is slow, the plant producing neither seed nor stolones the first year it is sown; and the young seedling is so very diminutive, that it is soon smothered by the rush of intruders; nor can it be relieved by weeding, as in the first year it is undistinguishable from other grasses.

Still the great crop of seed *florin* bears, and the facility of transmissal from its very diminutive size, make it desirable to get into stock *by seed*, where the distance is great; and in this case, I recommend the seed to be sown in flower-pots, first strongly heating the earth in an oven,

effectually to destroy all seed or concealed roots of other grasses.

The first mark by which the true species will be discovered, is the projection of the stolones over the edge of the pots; they will soon drop to the ground, which should be spread over with a little loose earth, to enable them to take root: they are not to be disturbed until the middle of September, when they will be fit to put out, and the cultivator will soon find himself in such abundant stock, that he will no longer think of seed.

That amateurs may not be imposed on by seed of the *agrostis vulgaris* (so common in the south of England) as is often the case, I am ready to transmit by post, a small paper of seed of my own sowing, to any amateur, on the sole condition of not being put to the expence of postage; and as I have been called upon from HOLLAND, as my correspondents tell me, by the advice of DR. BENNET, Professor of Rural Œconomy in the University of LEYDEN, I shall, by the first opportunity, leave a packet of fiorin seed with my booksellers, WHITMORE and FENN, Charing-Cross, for Dr. Bennet, to supply his Dutch friends with; and I shall also leave a stock with the above gentlemen, should their English customers wish for a supply.

I have often been asked what is the best season for laying down fiorin. Here, as in many other parts of his business, the farmer has not always an option; he must do several things when *he can*, though it be not the most desirable time: to determine that, we must speculate a little, *à priori*, and consider what difficulties our favourite has to encounter in its progress, that we may contrive to avoid them; none from seasons, for this hardy grass vegetates at all seasons; the roots equally, and the stolones tolerably; at the worst, that is, in the middle of winter, the only dif-

ficulty to be dreaded is the rush of intruding weeds and grasses.

The best possible season must therefore be that, when this HOST of enemies is able to do the least mischief, which I find is from the 8th of September to the 25th; for in this interval the efforts of vegetation are strong, and both fiorin and its rivals come forward vigorously; but the latter is soon destroyed by the winter frosts, to which the fiorin is quite insensible, and remains torpid, or rather languid, until it is with all other vegetables roused by the genial spring, and in its vigorous progress finds no rivals to encounter but those which are just beginning to vegetate—of course *diminutive* and *weak*.

Had we commenced earlier, the intruders would have time to acquire strength enough to sustain the frost, and the contest between them and the fiorin would have been carried on on equal terms.

This is all theory; but, however *sound*, my own practice has generally been different, for the obvious convenience of laying down fiorin after a potato crop has commonly thrown me so late as November: but I prefer availing myself of the nice state potato culture leaves the ground in, even at the expence of repairing in spring, the failures that have occurred from languid winter vegetation.

If we lay down in spring, we have the enemy to encounter in full vigour, and in this case I advise laying down in *drills*, that we may have the assistance of *the rake* in exterminating the weeds: but I totally condemn the proceedings of some, who, out of greediness, lay down fiorin like other grasses, with a crop of spring corn; when this is done, many small vegetables survive the corn, and encounter the fiorin with mischievous vigour.

I once tried two ridges for experiment with barley, but never could master the weeds: I would long ago have

broken up these two ridges, and laid them down anew ; but I reserve them these seven years, to give ocular demonstration of the folly of the practice by contrasting them with the clean crops on each side, laid down in the usual way.

Nor is any thing gained by this cunning practice ; for by careful management we can secure a fine crop of fiorin hay in the ensuing autumn, though the stolones be laid down even late in spring.

My most docile, and of course my most successful pupil, **Mr. BAIRD** of **SHOTTS, SCOTLAND**, had a field prepared for me on the 14th of **May** : I began myself to lay down the stolones, to teach the novel practice ; two intelligent labourers having got their lesson, had the field finished by **June 1st**, and in *November* **Mr. Baird** mowed the best crop ever seen in that country.

POSTSCRIPT.

A FRIEND who has been so good as to peruse the preceding pages, tells me, that I must not be content with showing, as I have already done, how I myself came to discover the value of *fiorin grass*;—but that it is incumbent on me also to show, if I can, how it happened that this same value came so long to escape the notice of man:—for it is objected, and especially in ENGLAND, that had this *agrostis* really possessed such value, and was capable of producing such luxuriant crops as I have stated it to be, it must long ago have obtruded itself on the agriculturists who paid any attention to the natural productions of their respective soils; the *agrostis stolonifera* being, as I have asserted, found spontaneous in all soils and in all climates.—My friend also assures me, that, to his own knowledge, this objection has contributed more to encourage incredulity on the subject of *fiorin* than any of the others so strenuously urged.

I have long ceased to notice the silly cavils against the culture of *fiorin*, so often brought forward by hostile and prejudiced ignorance; but as I know my friend to be influenced by very different motives, I concur with him in thinking, that my Imperial Pupil should be put on his guard, and prepared with answers to arguments which, it appears, have been so successfully urged.

The question I am called upon to answer is,—How came the great value of *fiorin grass* so long to escape the notice of man?

I shall commence my reply with the two last centuries ; a more enlightened period than any preceding, and in which more attention was paid to the study of nature and her productions, than in former times.

It appears from the 21, 22, 23, 24, pages of the preceding memoir, that the botanical and agricultural writers of the seventeenth century had been sufficiently observant of the natural productions of their country, that my favourite agrostis had not escaped them, and even that they suspected it to be of great value ;—how then came they not to pursue the subject, and actually to make the discovery ?

BECAUSE their object was to detail to the world what they *saw* and *knew* ; they were not looking for *new* discoveries : in short, they were not *experimentalists*, and it is by a succession of patient experiments alone, that the properties of *new*, or *any* vegetables, can be found out and established.

Their successors had other objects in view ; they were all *book-makers* looking to profit from the sale of their compositions and compilations alone ; perfectly indifferent to the general advancement of agricultural science, which they professed to *improve* and *teach*. Their motives are well described by HORACE

*Gestit enim nummum in loculos demittere ; post hoc
Securus, cadat, an recto stet Fabula talo.*

It may be more difficult to answer the question I have put, when we open a wider field and inquire, how the value of florin came to escape the observation of those who for so many centuries occupied, and availed themselves of the produce of our grassy surface.

These are of two descriptions, HAYMAKERS and GRAZERS ; who applied the produce of the gramina to the sustenance of their domestic cattle in very different ways. Let us try if either of these had any probability of disco-

vering the value of florin from any thing likely to occur to them in their own practice.

I commence with the *Haymakers*;—the Farmer has at all times availed himself of the first rush of the *earliest* of the culmiferous tribe of grasses—in fact, the most luxuriant and valuable of the description. He mows when he thinks the mass of the produce on the ground has attained its highest perfection, and he saves the crop for store; he has no indication *from nature* that the same ground is stocked with another grass of later period, capable of yielding him a much finer crop.

Should he have been by accident prevented from mowing at the proper time, the state of his late crop would have given him no information; a thick mass of culmiferous grasses in a state of decay, with a few weakly green stolones peeping through them; the efforts of this *agrostis* repressed, and the growth of its stolones impeded by the crowd already in possession—nothing to induce him to suspect the real value of this grass.

A haymaker, at any period previous to the discovery of florin, would have thought the man mad who advised him to root out all the early grasses that had hitherto formed his hay crop, as soon as they appeared; his *cock's-foot*, his *rye grass*, his *fox-tail*, and his *meadow fescue*; assuring him that nature of herself would give him at a later season a more luxuriant crop from another grass now growing in the same meadow, but which had as yet scarcely shown itself.

Strange as such advice might appear, yet it teaches the *practice* he must follow, if he expects a valuable florin crop, as the result of his own deliberate culture, or of the spontaneous effort of nature;—and it is plain, that to *this practice* the most attentive observation of his own could not have led him a single step.

As the *haymakers* were little likely to make the discovery of the great value *fiorin* is capable of affording to them, though so abundantly dispersed through their meadows ;—the remaining personage interested in the value of grassy produce (*the Grazier*), is still less likely to make the discovery, as in no instance does it ever obtrude itself upon him ; for the bite of his cattle nips the nascent stolones, and should they by accidental protection escape the *teeth* of his cattle, the feet of the beasts would soon destroy them.

The *grazier* even has often before his eyes strong evidence that his cattle will not eat *fiorin* stolones, as solitary strings frequently remain in his pasture grounds untouched by the cattle feeding about them.

I shall state a fact:—Examining THE MARQUIS OF HERTFORD'S meadows on the edge of LOUGHNEAGH, with another object in view ; I was joined by some of his lordship's tenants who knew I was directing the cultivation of *fiorin* for the Marquis ;—one of these pointed out to me several stolones on the meadow untouched by the cattle grazing among them, and asked me if I was recommending the cultivation of a grass which it appeared the cattle would not eat ? I begged he would let us finish our business, and, as we walked about, that he and his friends would pick up such stolones as they saw : a large bundle was thus gathered, and by my directions tendered to the first cattle we found, who devoured it greedily, showing a strong desire for more.

The fact is, cattle are not furnished with organs adapted to enable them to pick up solitary stolones ; this would require something like the bill of a bird : but whenever these stolones are gathered or severed, all sorts of cattle show a marked predilection for them.

Since then the only persons interested in, and intimately acquainted with, the grassy produce of our surface, to wit

the *Haymaker* and *Grazier*, were little likely to make the discovery of the great value of this agrostis; whose merit, and good qualities, as it appears, could in no instance obtrude themselves on their notice;—who is the personage, from whom it might be expected such discovery would be made?

The EXPERIMENTALIST alone, who, without waiting to receive previous hints, speculates in some sort *à priori* on the productions of nature, and tries if he can discover them to possess any *new* and *valuable* properties, which had hitherto escaped the notice of man.

I myself was not aware that nature had any concealed treasures among the *gramina*, my peculiar department: I indeed thought it possible she might; and if so, was certain that the present possessors of the *agricultural school*, the London seedsmen, and agricultural book-makers, would never discover them.

Under this impression I began to make experiments, and, to ascertain their respective properties, cultivated *distinctly* every grass I could find, for some years: the unforeseen result is the subject of the present memoir, drawn up for the information of the eminent Personage who has done me the honour to call for it.

W. RICHARDSON, D. D.



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